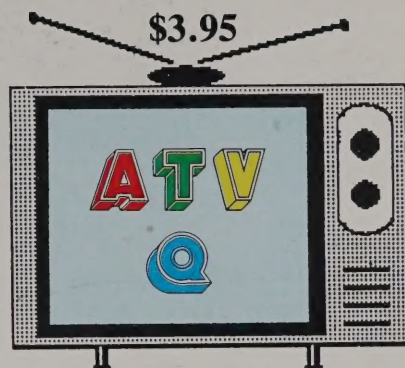


AMATEUR TELEVISION QUARTERLY

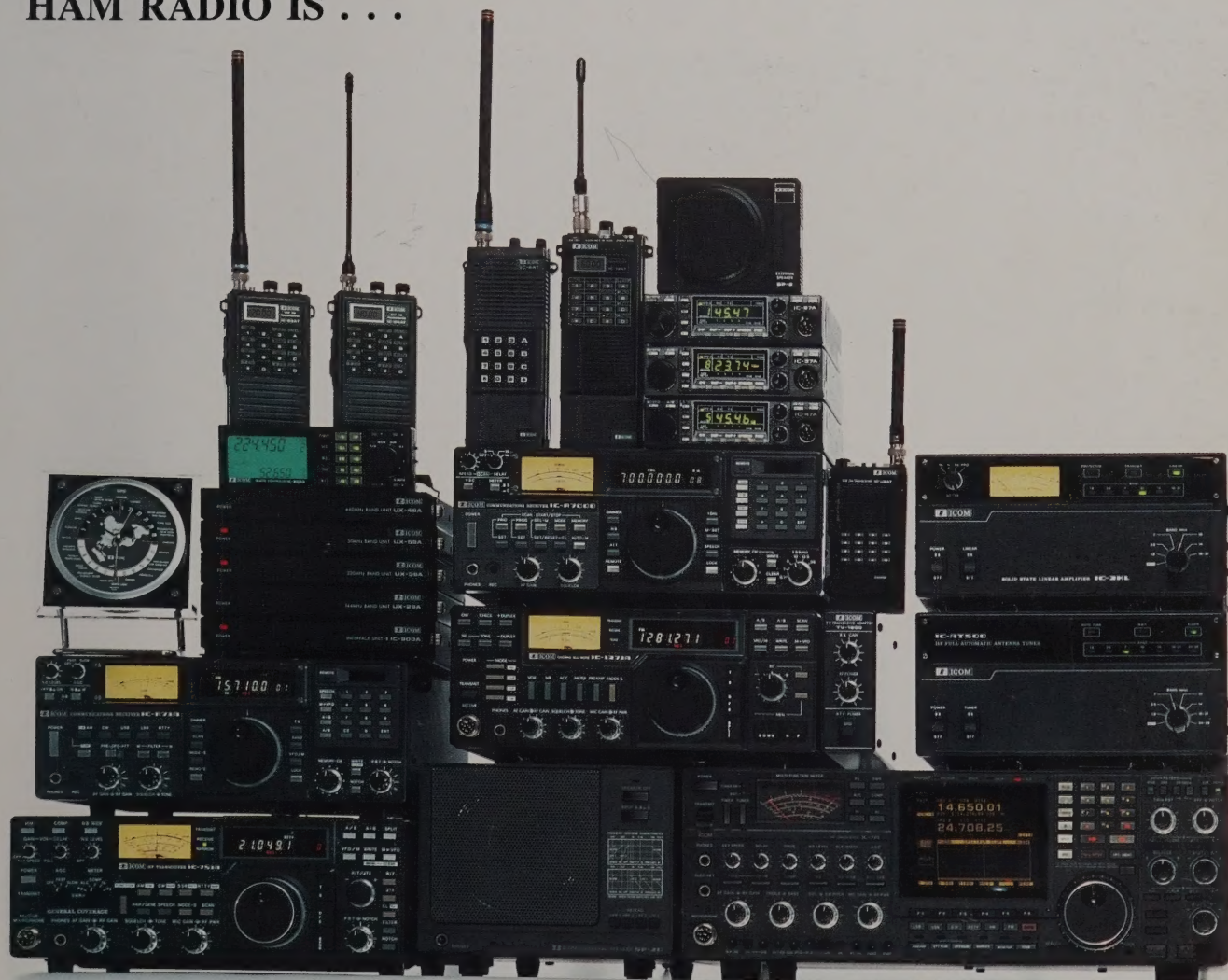
OCTOBER 1990
VOL. 3 #4

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DEVOTED ENTIRELY TO AMATEUR TELEVISION



HAM RADIO IS . . .



. . . MORE THAN RADIOS — EXCLUSIVE STORY PAGE 10

ICOM

IC-970 All Mode Transceiver

Tomorrow's Transceiver Today.



The New IC-970

Designed for the serious operator on 144, 440 and 1200MHz, ICOM's IC-970 brings futuristic technology to DX, digital and satellite communications.

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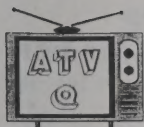
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All stated specifications are subject to change without notice or obligation. All ICOM radios significantly exceed FCC regulations limiting spurious emissions. 970190

For a brochure on this or any other ICOM product, call our Toll-Free Literature Request Hotline 1-800-999-9877.

ICOM
First in Communications



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V3 #4
OCTOBER 1990

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For subscription and other inquiries reach us at 708 298 2269. Leave your zip code when making inquiry about subscriptions. ATVQ is available in most Ham Radio stores.

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BACK ISSUES

ATVQ has sold out of every issue published. We have no back issues available. Back issues may be available at some retail ham stores.

REPRINTS

Reprints of ATVQ issues and articles are available from:

ESF COPY SERVICE,
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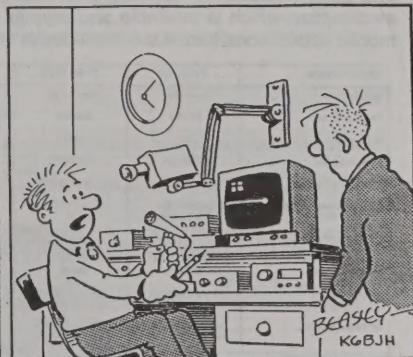
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FRONT COVER

FRONT COVER PHOTO
PROVIDED BY ICOM OF
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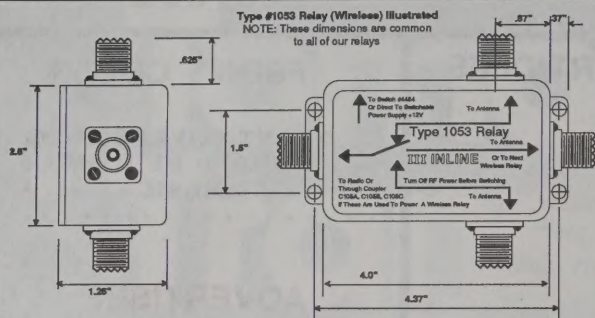
I WAS TALKING TO OLD FREED ON ATV WHEN
SUDDENLY HE JUST WENT STRAIGHT LINE!

AUTHORS COMPENSATION

ATVQ pays authors of original technical material. Compensation varies from \$5 to \$35 per item according to published length. Authors may receive the compensation as an extension of their subscriptions or cash.

ATVQ is always looking for news, activities and technical material. Send all contributions to ATVQ, 1545 Lee St. #73, Des Plaines, IL 60018. Photos should be in black and white but color are acceptable. Diagrams should be in black ink and neatly drawn.

INLINE™ Coaxial Antenna Relay Switching System



- ❑ Rugged Construction
- ❑ Waterproof
- ❑ High Reliability
- ❑ No Insertion Noise
- ❑ Uses a Single Coax
- ❑ Economical

INLINE™ coaxial relays are rugged, weatherproof devices that can be mounted on virtually any surface, indoors or out, wherever the relay is used to switch between two or more antennas while using only a single coaxial cable to the transceiver. Our relays are available in one of two styles **WIRED** or **WIRELESS**.

The **WIRELESS** style uses a separate coupler module installed near the radio. The coupler combines the RF signal and the relay energizing voltage to allow the coaxial cable to carry both signals simultaneously yet independently. This permits existing systems to be expanded with little modification. These relays and couplers have narrower bandwidths than the wired models, since their internal circuits contain filters which minimize harmonics beyond the relays' passband.

INLINE™ relays and couplers are capable of high power operation yet contribute no insertion noise in the receiving or transmitting modes. The INLINE™ design uses technology incorporating microstrip techniques resulting in a relay life expectancy of at least 10,000,000 transfer operations, offering many years of trouble free service in the field.

INLINE™ couplers can also be used to utilize D.C. voltage remotely via the coaxial cable to power other devices such as amplifiers and other equipment. Isolated D.C. energized relays are also a modification which is available and permits three-way switching in mobile applications from a common power source.

DESCRIPTION	TYPE 105	TYPE 108U	TYPE 108N	TYPE 1053
Switch Type	Two Position	Two Position	Two Position	Three Position
Frequency to...	180MHz	300MHz	950MHz	180MHz
Impedance	50Ω	50Ω	50Ω	50Ω
Energizing Coil	190Ω±10%	190Ω±10%	190Ω±10%	190Ω±10%
Energizing DC	±10V to ±16V	-12V to 0V to +12V	-12V to 0V to +12V	-12V to 0V to +12V
Insertion Loss Max. (dB)	0.2 to 30MHz 1.0 to 180MHz	0.2 to 250MHz	0.4 to 500MHz 1.6 to 950MHz	0.2 to 30MHz 1.0 to 180MHz
VSWR (or "SWR")	1:1.1 ---	1:1.1	1:1.2 to 500MHz 1:1.35 to 950MHz	1:1.1 to 30MHz 1:1.1 to 180MHz
Insertion Noise	NONE	NONE	NONE	NONE
RF Power W./CW	1250W to 30MHz 150W to 180MHz	750W to 100MHz 800W to 250MHz	300W to 500MHz 180W to 950MHz	1250W to 30MHz 150W to 180MHz
RF Power W.-SSB	2500W to 30MHz 300W to 180MHz	1400W to 100MHz 1300W to 250MHz	700W to 500MHz 250W to 950MHz	2500W to 30MHz 300W to 180MHz
RF Power W.-AM/RTTY	750W to 30MHz 150W to 180MHz	400W to 100MHz 400W to 250MHz	200W to 500MHz 100W to 950MHz	750W to 30MHz 150W to 180MHz
Crosstalk (dB)	-45 to 30MHz -30 to 180MHz	-45 to 100MHz -40 to 250MHz	-35 to 500MHz -30 to 950MHz	-45 to 30MHz -30 to 180MHz
Switching Time (Sec.)	0.01	0.005	0.005	0.01
Standard Connectors	BO29	BO29	Type N	BO29
Suggested Couplers	C105A (fixed) C105B (variable)	C108U (fixed) C108B (variable)	C108N (fixed) C108B (variable)	C105C (variable)

Unadilla

87 Belmont Street North Andover MA 01845
PH# (508) 975-2711 FAX (508) 474-8949

WHAT'S NEW AT 'Q'

PAMALA DASS NAMED NATIONAL SALES REP



As ATVQ G R O W S, we continue to make improvements to produce a better magazine. Our latest addition is Pamela Dass as national advertising manager. Pamela has lived in the monadnock region of NH for the past 18 years. Aside from working for other publications in the area in circulation and advertising she has a career in meditation teacher, councillor and interior designer. She is a closet dancer, poet and writer who longs to step out of the demands of surviving in a left brained society and fly the wings of creative talents. All advertising in ATVQ is now being handled by Pamela. She can be reached at PO Box 105, West Peterborough, NH 03468 or between 10 am and 7 pm at 603 924 6119 or 603 924 9455.

DAVE WILLIAMS WB0ZJP
ATVQ PHOTO EDITOR

In an effort to improve the quality of the pictures submitted to ATVQ, Dave Williams of St. Louis did all the half-tone production and photo editing for the issue. While our printer has done an excellent job on our full color cover photos, the interior photos, usually made from submitted color prints were usually too dark. Dave Williams has processed all of the photos in this issue to half-tones and also served as photo editor, choosing and cropping as needed.



SPECIAL CLUB OFFER

We have been receiving good response to a special club offer mailed to ham radio clubs in the US. So we will offer it to the ATV clubs too! This offer is for NEW SUBSCRIBERS only!

Copy the subscription forms in this issue. Take them and this copy to your local club meeting. Send in 5 or more NEW SUBS (not renewals) and save \$3 per yr--that's \$12/yr/sub. Send in 10 or more and save \$4 each --that's \$11/yr. Send in 20 or more and save 1/3, 33%, \$5/yr/sub--that's \$10 per year. NO LIMIT. Offer expires Sept 1, 1991! The discount is based upon the number of subs you send to us in a single envelope. Hurry! Don't let your friends miss another issue of the Q!

ATVQ WELCOMES NEW ADVERTISERS

ATVQ welcomes two new advertisers with this issue. ICOM of America and Unadilla.

Everyone I am sure is familiar with ICOM. Their quality products grace many an ATV shack for voice, packet and fun communications. ICOM supplied our front cover of this issue and in an exclusive story which you will find on page 10, is sponsoring the latest ham radio MOVIE. You should drop them a line and let them know you appreciate their efforts to promote ham radio and ATV!

Unadilla joins ATVQ to spread the word of their new coax relays. These are great for use with a home brew preamp to provide bypass switching and can be used in the shack or powered through the coax for a mast mounted preamp. They will also handle considerable power, which lends them for use with your solid state power amps. Here's a chance to include a preamp INSIDE the power amp. Unidilla has a large line of ham radio products for all modes and bands. Drop them a line for a catalog and tell them you saw them in the Q and appreciate them supporting ATV!

NEW LAYOUT

Also with this issue, we are following some suggestions from John Spaeth KD0LO of St. Louis. We've changed to 2 column format and added some white space to, as John says, "make it friendlier to read." We've also switched from newsprint, which was nicely inexpensive, to a white paper stock, more expensive and costlier to mail, but it looks better! Printing cost is a major item to the Q. The bill for the July issue was \$5,000. Postage was over \$1,000 and mailing service was over \$400. We did three mass mailings of the July issue, over 4,000 initially, followed by two supplemental mailings in response to our ads which offer a sample copy for \$4.

DOWN EAST MICROWAVE



MICROWAVE ANTENNAS AND EQUIPMENT

- Loop Yagis • Power Dividers •
- Complete Arrays • GaAs FET Preamps
- TROPIC-EME • Weak Signal • OSCAR •
- Microwave Transverters

902 1269 1296 1691 2304 3456 MHz

2345 LYK45el 1296 MHz 20dBi \$89

1345 LYK45el 2304 MHz 20dBi \$75

3333 LYK33el 902 MHz 18.5dBi \$89

Above antennas kits available assembled.

Add \$8 UPS s/h

Add \$11 UPS s/h West of the Mississippi.

MICROWAVE LINEAR AMPLIFIERS SSB, ATV, REPEATER, OSCAR

2316 PA 1w in 18w out 1240-1300 MHz \$265

2335 PA 10 in 35w out 1240-1300 MHz \$315

3318 PA 1w in 20w out 900-930 MHz \$265

3335 PA 10 in 40w out 900-930 MHz \$320

23LNA preamp 0.7dB N.F. 1296 MHz \$90

33LNA preamp 0.9dB N.F. 902 MHz \$90

NEW PRODUCT ANNOUNCEMENTS

New Loop Yagis

1845 LY Loop Yagi 1691 MHz 20dBi \$99

945 LY Loop Yagi 3456 MHz 20dBi \$89

Above antennas assembled and tested

New Preamps

13LNA 0.7dB N.F. 12 dB 2.3 GHz \$140

18LNA20 0.8dB N.F. 20 dB 1.69 GHz \$350

SLNA 1.0dB N.F. 10 dB 2-2.7 GHz \$150

New Wideband Power Amplifiers

2370 PA 3w in 70w out 1240-1300 MHz \$695

2340 PA 2w in 35w out 1240-1300 MHz \$355

2318 PAM 1w in 18w out 1240-1300 MHz \$205

Rack mount Amplifiers for repeater use available.

NO TUNE MICROWAVE LINEAR CONVERTERS

From SHF SYSTEMS a new line of converters

designed by

Rick Campbell KK7B and Jim Davey WA8NLC

Available in kit form or assembled/tested

- 903 1269 1296 2304 3456 MHz
- microstrip filters eliminate tune-up
- 2m I-I, PIN diode switched
- sequencer standard in complete unit
- low profile packaging, mast mountable

All active equipment - 13.8V

DOWN EAST MICROWAVE

BILL OLSON, W3HQT

Box 2310, RR-1 Troy, ME 04987

(207) 948-3741

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PS Form 3526, Feb. 1989

LIVE DEMO'S ATTRACT INTEREST

BEMARC

LISATS ORGANIZES WITH LIVE ATV DEMO 22 GATHER AT MERRITT ISL. TO START NEW ATV GROUP LAUNCH INFO SERVICE COMMENCES

The camera tally light was blinking, for official "video" minutes, on the evening of March 29th as 22 radio amateurs and ATV enthusiasts from all over East Central Florida kicked off the formal organization of the Launch Information Service and Amateur Television System (LISATS) at Quincy's Restaurant on Merritt Island. The group set quarterly meetings and a quarterly newsletter as two fundamental business items. Efforts were begun to hold discussions with the National Weather Service office at Melbourne regarding transmission of radar weather display.

The attempted launch of Hubbell saw the first activity of the LIS, on 146.34/94 MHz and it received favorable reports. Several visitor hams asked for info as well as locals. Members who would like to take their turn at bat as Net Control should contact K4RBD. The task is simple...answer questions...when they are asked...and to maintain some info on countdown status.

With the cooperation of Quincy's management, three TV receivers, loaned through the courtesy of Calvert's TV, Cape Canaveral, were on display in the dining rooms. The receivers, connected to ATV down converters with 6" antennas, were receiving stable, P5 color pictures from the meeting room cameras/transmitters. During the non-business part of the gathering, guests found themselves on ATV. Placards were placed at the receivers explaining what amateur TV is all about.

ATV EQUIPMENT SHOWN

An ATV Show was provided for the attendees. ATV equipment by PC Electronics, Wyman Research, AEA, North Country Radio and Communications Concepts, Inc. was displayed and operated. K4RBD walked around with his backpack ATV walkie-lookie rig transmitting to all the down converters.

Attendees took home handouts from PC Electronics, courtesy of Tom, W6ORG. Other goodies obtained were address lists of vendors, test patterns, and how-to lists.



Several members of the Bayonne Emergency Management Amateur Radio Club, have become active in ATV and they want to share their new found excitement with others. BEMARC is located in Bayonne, NJ just across the Hudson River from New York City. One of the active ATVer's is John, WA2QYX who is also the ARRL Northern NJ Affiliated Club Coordinator. He suggested that many clubs might enjoy an ATV demonstration as part of their club meeting program. Together with Danny, N2EHN and the BEMARC President Mike KB2EQQ, they set out to provide live demonstrations of the ATV mode.

The group first video taped some attractive scenes from Liberty State Park in Jersey City and dubbed over the audio with a short history of ATV and a brief explanation of the program to follow. Next, they set up Danny's van for mobile TV action using a vertical whip for an antenna and a PC Electronics 10 watt transmitter, or John's AEA FSTV-430 unit. The camera used is a S-VHS camcorder. Inside the club meeting room, a simple mag mount vertical antenna is set up for reception with either a PC Electronics down converter or the AEA unit connected to the television set. Some clubs have elaborate UHF antennas of their own which extends our mobile capabilities considerably.

When the BEMARC mobile TV crew arrives at a club meeting site, we usually park the van in a nearby parking lot or other interesting location. If possible, we park on a busy local street and capture the colorful scenes in the small store windows and the people shopping. One member of our group, usually Mike, KB2EQQ, sets up inside the club. He shows all the equipment used for ATV and removes the covers on the units to explain the function of each board. We use HT's on simplex for audio between the mobile van and the club meeting room. In this manner, any club member who has a question for the outside crew can ask it and hear the answer over the television. Full duplex is possible in that manner.

The demonstration starts with the video tape transmitted from the camcorder in the mobile van. Next we switch to live action and show all the outdoor scenes in the area. Before we complete our demonstration, we usually ask some of the club members to come outside and we transmit their picture back to the club.

Since December 1989, our club has completed 6 demonstrations in this manner. We have received many comments about our ATV activity and several more hams have purchased ATV equipment in our area.

If your club is located in the New York City/Northern New Jersey area, and you would like the BEMARC ATV road show, contact our club president, Mike KB2EQQ.

"THE HAMCAM STORY"

by Gene Kirby, W8BJN



Last July (1989), I received a call from a fellow amateur radio operator, who works for a local commercial TV station in Columbus, Ohio. He explained that his station was getting ready to retire one of their RAPIDCAM trucks and he asked if our radio club would like to have it as a gift. "Are you kidding?" I replied. "Of course we would!"

A few weeks later the Union County Amateur Radio Club (Marysville, Ohio) was the proud owner of a 1982 Chevy van. Part of the deal was that we had to get the van repainted and also remove and return some of the equipment they had left in the van. No problem. Removing the air compressor and the power plant was easy. They were returned to the TV station quickly. Getting the van repainted was not easy. Being a poor club... (most are, I guess...) we looked for the proper paint to do the job right. After a long search, we made a deal with the local Ford dealer (also a ham) to buy the paint at his actual cost. Now we must find someone to spray the van and do a little body work.

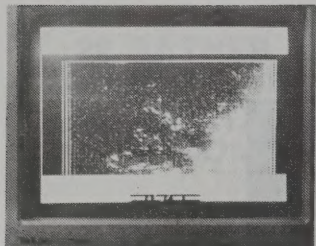
An old buddy came to mind, and after a lot of begging he agreed to do it, but at his convenience. This was agreeable by the members of the club and the van was driven to his shop in nearby Springfield, Ohio. Time passed..(a lot of time..) and then the van was done. It was really white and had no signs of rust on it.

Now it was ready to be relettered and have our radios installed. Miles of cable and plugs and wires were removed from the van and some other modifications were made. Then the lettering was done, and it became the HAMCAM truck.

We then installed a new P.C. Electronics ATV transceiver and beam antenna, a TV switcher, three rack mounted TV monitors, a sound board, tape deck and amplifier and two video cameras. A new VHS VCR was installed as well. Next the radios were installed. A two meter base station, a CB radio and a new Kenwood low-band radio (owned by the local Civil Defense) took their place in the compartment. In the rear compartment, we installed the club owned Collins KWM-2 and the 10 mtr FM station. We had a little room left over, so we installed a scanner and some other 'goodies'. The van is air-conditioned and has big soft chairs installed. It has big floodlights on top for night-time use.

We have a lot of plans for the new HAMCAM truck. We would like to work with the local Civil Defense, Red Cross, Fire Department, and the County Sheriff (I am a reserve deputy) and be able to provide them with both video and radio contact to their offices during emergency conditions anywhere in the county. We have a lot of work to do on the van, but for now we are displaying it at the local fairs and hamfests. We also plan to take it to malls, etc in the future. "Smile, you might be on HAMCAM TV."

WEBERWARE IMAGING SOFTWARE NOW AVAILABLE



Beta testing of Weberware 1.0 is complete and is now released for general distribution.

The unique package made its debut at the Dayton Hamvention. Many a satellite enthusiast were thrilled as an actual picture captured from WEBERSAT/OSCAR-18 was processed on an IBM PC as they watched.

Chris Williams, WA3PSD of Weber State University, said that although the early pictures from WO-18 were not all that interesting, now that ground controllers at WSU have a better understanding of the Microsat's attitude motion, they have modified the on-board software so that more pictures of the earth are now being snapped. In addition, the software now maintains better control of the CCD camera iris settings and settling time.

Through more operational experience, many more exciting pictures of the earth are expected soon.

Weberware 1.0 is designed to work on IBM PC clones which support EGA or VGA graphics. WP-18 is constantly sending picture data and the imaging data can be easily collected with a PSK modem. For further information about Weberware 1.0, contact the AMSAT-NS software exchange at (301)589-6062.

SUPER HIGH PERFORMANCE TRANSISTOR

TO-3PJ
Fig. T48-1

TAB
CONNECTS
TO COLLECTOR



TO-127
Fig. T46

METAL
CONTACT
CONNECTS TO
COLLECTOR



Varian Associates Inc. had developed a record-setting indium phosphide (InP)-based high-electron mobility transistor (HEMT) with an operational speed of 260 GHz at room temperature. Company researchers believe that this HEMT is among the fastest such devices yet developed.

Since the transistor is based on InP, the same material used for many optical devices like laser diodes and photo detectors. Varian sees potential applications in opto-electronics, including in high-speed fiber optic communications systems.

InP-based circuits are more efficient and much easier to integrate with optical devices than their silicon or gallium arsenide counterparts because they can be fabricated using the same materials "system" as long wavelength (1.3-1.55 μm) laser diodes or detectors.

In ultra wideband fiber applications, the InP circuit design potentially allows for integration of optical and electronic functions on the same chip. For instance, this InP device could be used to capture a high speed optical signal from a fiber optic cable. Integrated on the same circuit could be InP amplifiers, multiplexers or clock recovery circuitry that would process information rapidly, while maintaining the integrity of the data.

MOST UNUSUAL ATV'ER

From Channel One, KC,MO

Bud KFOFQ of Climax Springs, Mo. has won the USATVS Fast-Scan ATV contest. Bud became a member as a result of the contest and working so many KCATVG members. It has been reported by Bud that if not for KCATVG members, he would not have submitted a log. Mike, KD0FW is said to have come in second and Dale WAONKE came in fourth. I know I had a blast working Bud, John NUON and seeing Mike, NOALJ's sync bars at 180 + miles - WVOJ.

Undoubtedly, the most unusual reports were given out by WAOWPJ -Craig of Kansas City, Missouri. He didn't have a transmitter and only during the contest did he become receive capable on 70 cm. His equipment wasn't particularly noteworthy, being just the typical "first attempt" ATV receive station: cable ready TV with Radio Shack preamp and a low height 70 cm. beam. Craig

does, however, use 2 items in his ATV station that are unique. For detecting color he uses a Ten Tec Argonaut tuned to 3.579 MHz. and for logging he uses a braille writer. You see, Craig is blind and has been from birth. The ATV bug hit him and after he found out that ATV signals had audio and that our ATV repeater was a source of both video and audio for the Space Shuttle.

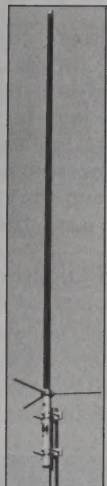
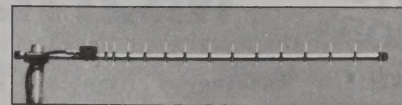
Craig's reports are just like any other ATV reports. P-something and color or black and white. He uses his "calibrated" ear to listen to the audio noise on the signal and then gives a P-unit report. If he hears the color burst carrier on the Argonaut, which is attached to the composite video output of the TV, he reports receiving a color signal. He can't tell you what color shirt you have or if you are out of focus, but he can give you at least 1000 contest points!

COMET

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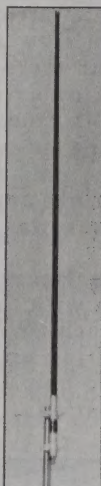
CYA-1216E

16 Element Yagi Beam 1260-1300MHz
Gain: 16.6dB
VSWR: 1.5:1 or less
Impedance: 50 ohms
Max. Power: 100 watts
Polarization: Vertical or Horizontal
Length: 4' 5"
Weight: 7 lbs. 11 ozs.
Mounting Mast Diameter: 1 1/2"
Connector: N-type
Construction: All Aluminum



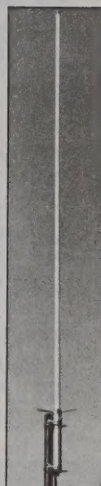
CA-1243Z

Dual Band
440-450MHz
1250-1300MHz
Base/Repeater Antenna
5/8 Wave x 4 446MHz
5/8 Wave x 9 1200MHz
Gain: 44.6 dB
1200 12.8dB
Impedance: 50 ohms
VSWR: 1.5:1 or less
Max. Power: 446 150 watts
1200 50 watts
Length: 7' 5"
Weight: 2 lbs. 8 ozs.
Connector: N-type
Construction: Heavy Duty Fiberglass



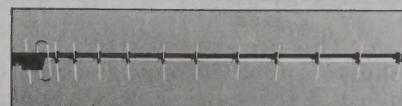
CA-1221S

Mono Band
1260-1300MHz
Base/Repeater Antenna
1/2 Wave 21 Step Collinear
Gain: 15.5dB
Impedance: 50 ohms
VSWR: 1.5:1 or less
Max. Power: 100 watts
Length: 8' 6"
Weight: 2 lbs. 3 ozs.
Mounting Mast Diameter: 1 1/2 inches
Connector: N-type



PYA-913

Base 13 Element Yagi
904-920 MHz
Gain: 15.8dB F/B ratio over 20dB
Max. Power: 150 watts
VSWR: 1.5:1 or less
Length: 4' 8"
Connector: N-type
Construction: Aluminum



MINI SWR

		Power Meters	
		Max. Power	Insertion Loss
CM-200	140-150MHz	45 watts	0.1dB
CM-300	200-240MHz	60 watts	0.2dB
CM-400	420-460MHz	50 watts	0.2dB
CM-420	140-460MHz	50 watts	0.1-0.2dB
CM-900	840-950MHz	60 watts	0.2dB
CM-1200	1250-1325MHz	60 watts	0.25dB

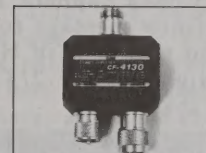
Measurements: 2.25" w x 2.25" h x 1.1" d
Weight: 5.25 oz.
CM-200, 300 and 400 have SO 239 Connectors
CM-420, 900 & 1200 have N Connectors

FP-19

Base/Repeater
905-925MHz
Gain: 16dB
Impedance: 50 ohms
VSWR: 1.2:1 or less
Max. Power: 100 watts
Length: 7' 4"
Connector: N-type
Construction: Heavy Duty Fiberglass

CF-4130 446/1200MHz

dB Loss: 1.3-460MHz 0.2dB
900-1400MHz 0.3dB
Band Rejection: 55dB Down
Max. Power: 146MHz 800W PEP
446MHz 500W PEP
1200MHz 200W PEP
Connectors: N-type

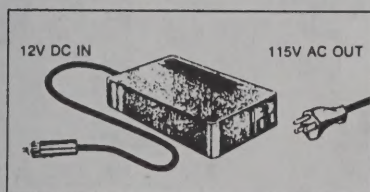


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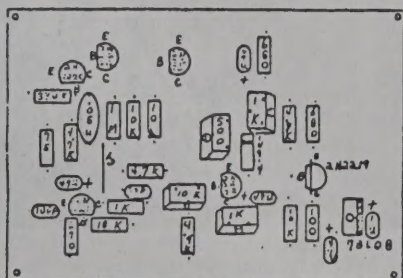
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Voltage Out: 115 VAC RMS
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Peak Power: 200 Watts
Constant Power: 100 Watts

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Length: 4.5" (9.0 cm)
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**EXCLUSIVE
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STORY**

MORE THAN RADIOS

The Western Washington Amateur Television Society (Seattle) is participating in a major video production about amateur radio. The video is being produced by Z-man Productions of Bothell, Washington. This project was started last June and location shooting took 10 days and was completed in late August. Editing began in late September and completed in October.

The video will be shown in the Pacific Northwest in private showings at selected events and meetings for several weeks. Then, the video will be shown at Dayton '91 that will begin its national distribution. The video will be offered free to amateur radio clubs.

Although the story line is being kept secret, the director, Chuck Zappala, KE7SA, says that the video has a definite message to amateur radio operators. The video was shot in Hi8 using two special pro-format high density 2/3 inch CCD chip cameras. Some of the scenes

were also shot with the cameras mounted on the new Cinema Products' Steadicam JR camera stabilization system. This allowed very smooth camera movements while following the action.

The production crew and actors were composed mostly of amateur radio operators. There are six actors, two speaking extras, and ten non-speaking extras and about 15 production crew members. The very long shooting days had its toll in the very unusual 90 degree plus days. The crew consumed gallons of cold drinks and food to keep them going. A food services crew was required to keep the talent and crew going.

At one location, Henry Ruh, KB9FO, flew in and began discussions with the video project's publicity man, Chuck Northcutt W7SRZ, from WATTS. Henry is helping by setting up national distribution and special events and help fund production. So, watch for more information.



PHOTOS: above, Ckuck Zapella and crew rehearse a shot with the steady cam on location at the Edison Cafe, Edison, WA. RIGHT: Location of some of the movie, MORE THAN RADIOS. Food fans take note, this is a real place, rented for the shooting of the movie. The food is good and they also sell great home made preserves from in-season fruits and berries! Its located north of Seattle and about 5 miles west of I-5. Photos by Henry KB9FO.

KB9FO TAKES YOU BEHIND THE SCENES OF "MORE THAN RADIOS"

Many years ago, around 1969, I put together a radio show about ham radio called the Marconi Experiment and aired on a handful of stations. Later while at NET TV in Ann Arbor, I produced and distributed a 60 Sec. TV PSA spot and sent out over 200 copies to stations all over the country.

While working at Indiana University in the late 70's I put together a TV show about ham radio. We had one 1/2 hour program. I had also managed a few "one shots" on TV stations in Michigan, Kansas, Wisconsin and Indiana.

I moved back to the Chicago area about 8 years ago. The Schaumburg ARC, a suburb of Chicago, contacted me and asked if I would do a show for their CABLE TV distributed program. Seems they were producing a half hour program every month which was aired weekly (in re-runs) on the suburban CATV systems.

As readers know I again raised the idea of a regular TV show about ham radio in a recent issue including an outline of how I thought it might be put together. Over the years I have also received a few letters saying the writer also had such an idea, but often these folks lacked content, sponsors, access etc. I Spoke with Harry Tootle who used to have a Satellite TV show with a varied program content. Yes, he was interested in producing a show again and could the hams provide regular material. He had a network willing to provide 1/2 hr. per week. I tried to gain support for the idea

and although many hams/atv'ers said they would provide material on a regular basis, alas few did.

But out of the ashes...

If Steven Spielberg ever made a movie about Ham Radio, this would be it! The WWATS (Seattle ATV club) has been working all summer on a new video movie. The title is, "More Than Radios". I can't tell you the plot (sworn to secrecy when I visited the movie shooting in Edison, WA).

The producer is Chuck Z. as his buddies call him. He has put together a professional script, a crew of movie makers, all in true Hollywood fashion with location shooting, lights, pro quality equipment, and a story line that can't be beat. The output of the grand effort will be a movie about Ham Radio that will knock your socks off.

After seeing the rough cut version, ICOM of America agreed to sponsor the entire production cost (to date over \$10,000) in exchange for a mention at the end of the movie. ICOM is doing this not for commercial value, but because the story line and production quality are first class and its a story that needs to be told. This movie will be the strongest effort in promoting and preserving ham radio to date, and probably for a long while.

Copies will be available for broadcast as well as club and personal use. ATVQ is acting as a central clearing house for inquiries.



On location of More Than Radios movie.

TECHNICAL FUNDAMENTALS VIDEO MAGNETIC TAPE RECORDING by Henry KB9FO

The whole process of magnetic recording allows us to do two things: (1) to store the information for use or air at a later date, and (2) to manipulate the information through the process of editing. Magnetic recording originally began with audio. Magnetic recording of video is exactly the same as the magnetic recording of audio, only slightly more complex in some ways. Let's start by considering the magnetic recording of audio.

AUDIO RECORDING

Magnetic recording is based on the principle in physics that electricity passing through a coil of wire will create a magnetic field. If within that coil of wire there is a core of soft iron, that iron will become an electromagnet. The process works in the reverse direction so that taking a permanent magnet and moving it in a coil of wire will create an electric current in the coil of wire.

In the simple process of analog audio recording, we have a record head, which is a coil of wire wrapped around a soft core of iron, see figure 1. Then we take the sound energy and convert it to varying voltages. When these voltages flow through the coil of wire in the record head, they cause the record head to become a magnet. This strength varies depending on the amount of electricity that is flowing through the coil of wire around it. The amount of electricity varies depending on the strength of the signal of the sound information coming into the microphone. The signal is both the amplitude and frequency of the sound information coming into the microphone.

Between the two poles of the magnet in the head, or two side of the soft iron core, there is a gap. This gap is the small slit that you would see if you could look closely at an audio stack. See Figure 1. These are the north and south poles of the magnet. As the tape passes in from one side of the head, these varying magnetic strengths are transferred to the audio tape. The surface of the tape is an iron oxide and it is magnetized by this small electromagnet.

These varying magnetic fields are recorded as varying magnetic strengths on the audio recording tape. This is how we store the information. We now have varying magnetic fields that are analogous to the varying voltages of the audio signal, which are analogous to the sounds coming into the microphone. Mind you, the particles on the tape do not move as we see figure 2. What we are simply doing is creating small magnets on the tape, as these little pieces of oxide are magnetized and retain the magnetic energy.

The process of audio recording is a direct analog process. Playing back the tape is reversing that process. We take the tape, which is magnetized, and pass it across the front of the playback head as shown in figure 3. The varying magnetic fields on the tape cause current to flow

in the coil of wire that is wrapped around the soft iron core in the playback head. Varying voltage levels are produced in the coil of wire, and these are taken into the amplifier section, amplified, and then reproduced through the speaker, as the sound that was originally recorded.

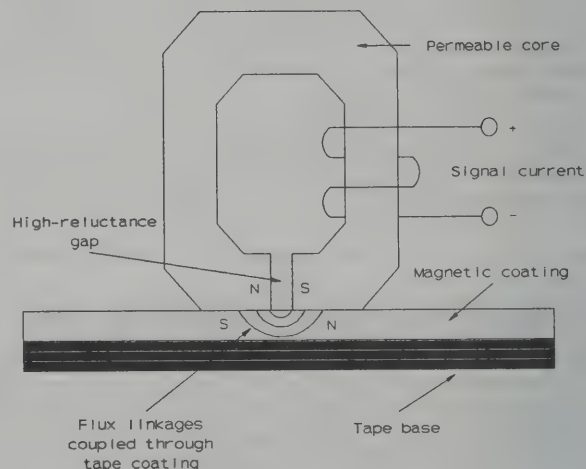


Figure 1. A typical record/playback head.

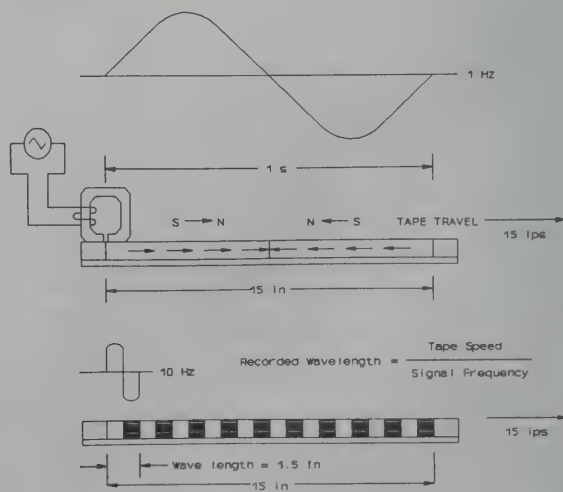


Figure 2. This is how the signal is recorded on the tape.

TECHNICAL FUNDAMENTALS VIDEO MAGNETIC TAPE RECORDING

VIDEO RECORDING

The process of video recording is almost identical to audio recording in the sense that there is a record head and a playback head (which are simply coils of wire wrapped around soft cores), and there is bias and equalization. But there is one additional factor in dealing with recording video. To record all the video information in the direct analog process, as audio is, would require running the tape at an extremely high rate of speed due to the quantity of information that a video signal contains. The problem with that may be obvious. It would take huge rolls of tape to store very short programs.

But we do have a way of encoding the signal so as to create a small amount of information out of a large amount of information and storing it that way. In the process of playing back, we take the small quantity of information and restore it to this original large quantity for playback purposes. The process that we use is the process of modulating a carrier frequency.

In a broadcast television station's transmitter, the video signal is transmitted on the basis of amplitude modulation, and the audio signal is transmitted on the basis of frequency modulation. In magnetic recording, audio signals are direct analog recordings and are not modulated. However, a video signal is a frequency modulated signal and is recorded on the tape that way.

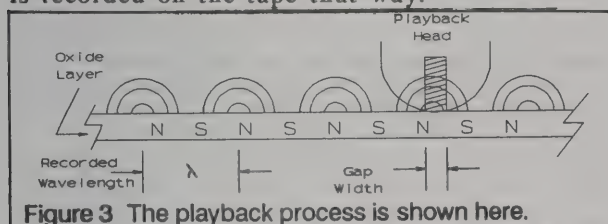


Figure 3 The playback process is shown here.

EIAJ 1/2" FORMAT

Figure 4 shows track layout for the 1/2" EIAJ open format introduced in the late sixties and in general use ever since. Note that the audio track is at the top edge, the control track is at the bottom edge and the space in between these longitudinal tracks is occupied by the slanted video tracks.

A blank 1/2 inch video tape is recorded on by a spinning cylinder with two video heads utilizing what is called a helical slant track scanning system. The tape slowly passes by this high speed rotating cylinder in which the video heads are fixed a 180 degrees apart from each other.

The drawing in figure 5 shows two pair of record heads: one set of Hi-Fi audio, the other video. The heads are mounted on a scanning cylinder that rotates. See figure 5. The video tape flows past the scanner at an angle to the heads. Each audio and video head scans (crosses) the tape from one edge to the other. During each crossing one field is recorded. The tape speed is slow (1 5/16 ips) compared to the video drum speed which is 500 times faster (1800 rpm).

OCTOBER 1990 VOL. 3 #4

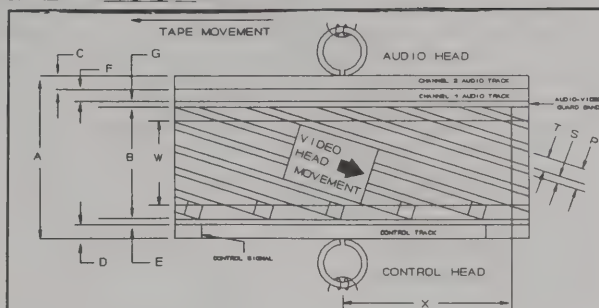


Figure 4 EIAJ 1/2" Format.

ITEM	UNIT	DIMENSION
1. (A) Tape Width	mm	12.7±0.01
2. (V) Tape Speed	mm/sec	190.5±0.01
3. (C) Drum Diameter	mm	115.92±0.01
4. (V) Writing Speed	mm/sec	11.1
5. (P) Video Track Pitch	mm	0.173
6. (B) Tape Width used Video	mm	10.65
7. (W) Video Width (one field)	mm	10.10
8. (C) Audio Track Width	mm	1.0
9. (D) Control Track Width	mm	0.8
10. (f) Audio Guardband Width to Video	mm	0.15
11. (g) Control Guardband Width to Video	mm	0.1
12. (m) Beginning of Scan Overlap Width	mm	0.27
13. (n) End of Scan Overlap Width	mm	0.28
14. (C) Video Track Angle (tape not moving)	mm	3°11'
15. (C) Video Track Angle	mm	3°7'43"
16. (l) Video Track Length (one field)	mm	165.1
17. (X) Audio and Control Head Position	mm	81.0±0.3

One head lays down a track of RF (radio frequency signal) one at a time, each track equaling one field of information. The heads switch off as the scanner revolves around in an A/B, A/B switch sequence. When one video head is making its pass across the tape it records one TV field. During this time, the other video head is making its trip around that part of the scanner not in contact with the tape.

To obtain more surface area to record on, creating longer video/Hi-Fi audio tracks with the narrow 1/2 inch video tape stock, the tape flows around the scanning cylinder (the wrap is greater than 180 degrees) at an angle to the drum.

The tape travels through upright moveable guides and creates this slant angle and the spacing (pitch) of each track. As the tape is pulled past the video heads incoming signals, in the form of different frequencies and levels, are converted to specific magnetic field patterns on the video tape by the head. The different frequencies and levels of electrical energy that make up the video and audio signals create different frequencies of magnetic fields. When played back the specific magnetic signals are converted back to electrical energy creating a video/audio signal.

TECHNICAL FUNDAMENTALS VIDEO MAGNETIC TAPE RECORDING

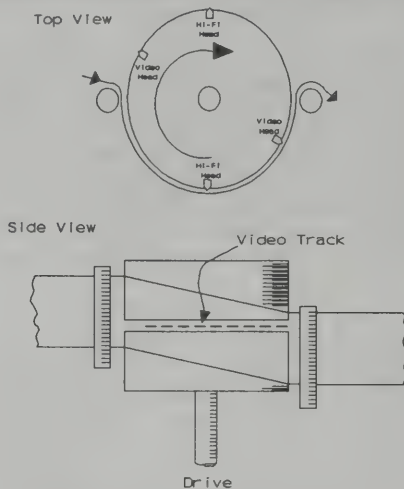


Figure 5 The scanner assembly.

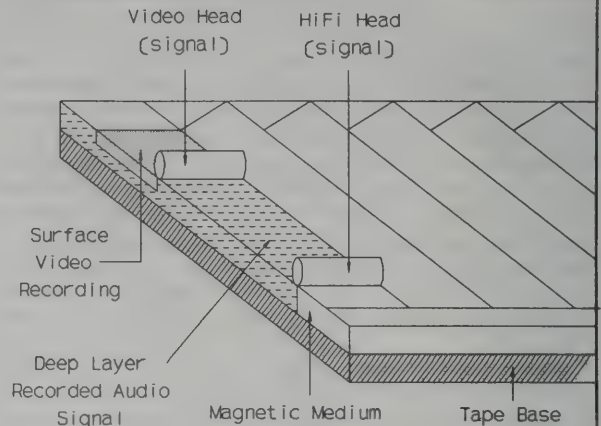


Figure 7 Depth Multiplex Recording.

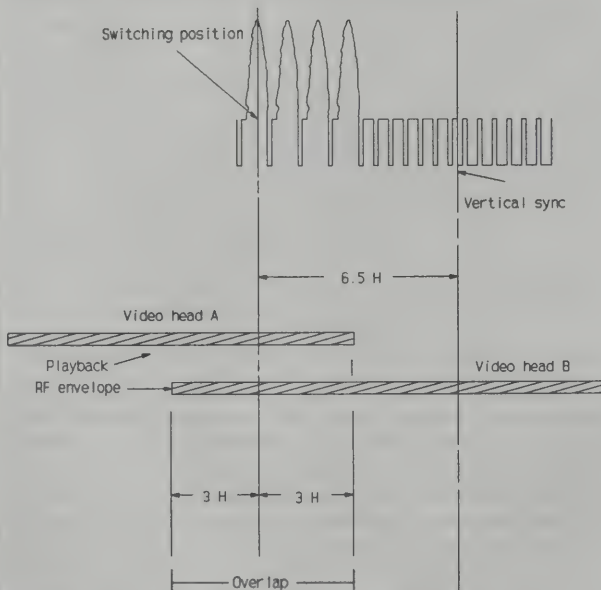


Figure 6 Six line head overlap "Switching Point".

About six horizontal lines before the first video head leaves the tape the second heads begins its pass to record the next field. Thus, there is a six-line overlap during which both heads record the same information. That over-lap is known as the switching point as shown in figure 6. The heads pass across the tape 60 times a second equaling 30 complete frames of picture.

The Hi-Fi audio signals are recorded first on a deep layer of the magnetic coating of the tape. The video heads follow and these signals are recorded over the top of the audio signal, on the surface of the tape by erasing part of the audio information track. This process is called Depth Multiplex Recording. See Figure 7 for details.

The playback results of recording FM audio signals in this high speed system are a much quieter sound track. There is extended dynamic range (80db) and high frequency saturation (distortion) and tape hiss noise regions is placed outside the range of human hearing.

Linear audio sound is recorded by a fixed record and playback head. It applies a thin 1mm track area at the top edge of the tape longitudinally. A control track head produces sync pulses (30 pulses per second) at the bottom edge of the tape, also on the thin 1mm track. This CTL head is also a fixed position head.

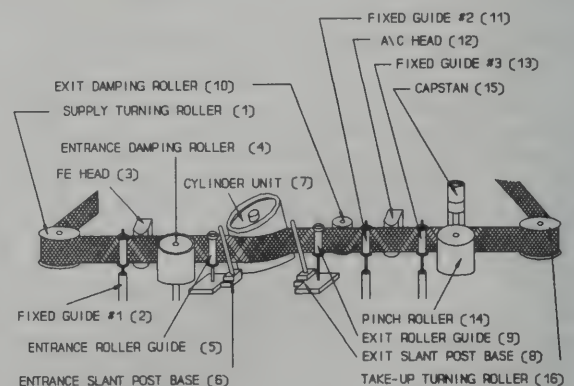


Figure 8 tape path.

ERASING A TAPE

Now that we have recorded information, what do we do in the event we want to erase this information? The process of erasing a tape is done in two ways.

TECHNICAL FUNDAMENTALS VIDEO MAGNETIC TAPE RECORDING

First, the tape can be bulk erased. This is a process of putting the tape into a rather large electromagnet which creates a very strong magnetic field, but at only one frequency. Through its process of operation, it draws on the tape. But because it is of one intensity, and a rather low intensity at that, the tape appears to us to be blank.

The second way of erasing a tape uses the bias signal. There is an oscillator in the machine that creates the bias frequency for the purpose of preparing the tape to receive the signals that we want to record. It is this oscillator that is also used to create an erasing signal.

The bias frequency recorded at much higher energy levels erases the tape. The magnetism is still there, but it is a steady continuous signal (not one that varies) and is of a high frequency. The erase field decreases with distance from the head pole piece. As the tape passes through this decreasing field, the ability of the field to change the magnetic domains is reduced until it can no longer change the polarity of the individual pieces of oxide. This produces a random distribution or an erased tape. The effectiveness is measured as a noise level which is residual to the tape from erasure compared to full tape saturation.

In the process of recording, when we go into record, the erase head is turned on (unless we bypass it as in the case of audio recording where one would want to record sound on top of sound). The audio record process turns on the audio erase head, and in videotape, recording turns on the video erase head prior to the record head.

Using the bias frequency and a high energy magnetic signal from the bias oscillator, we record the signal on the tape before the record head puts its information down. In this way, the tape is made to appear blank and then as the record head goes into operation, new information with varying magnetic strengths is recorded onto the tape. This signal can be played back later.

It is not essential to bulk erase tapes when recording over them for either audio purposes or video purposes. However, to prevent leftover unwanted information from appearing at an inopportune moment on a piece of tape it is wise to do so. Also if the erase head on your machine fails, the unerased signal will be under the new desired signal and cause variously noise or interference.

TAPE PATH ALIGNMENT

The control of tape flow in audio recorders is simple and straightforward because the tape moves in a flat plane containing the supply and take-up reels, the capstan/pinch roller and the stationary heads. The situation is quite different in a video recorder.

Adjustment of the entrance (5) and exit (9) guides is extremely critical for two reasons. See Figure 8. First the angle that the tape-bearing surface of the guide makes with the chassis determines the angle the tape takes with respect to the chassis. This angle must be set so that the lower edge of the tape meets the guide band or rabbit on the scanner at precisely the right altitude. To

facilitate adjustment, the bottom of the guide is machined at an angle to the guide axis. Thus, rotating the guides (5) acts to change the angle at the tape-bearing surface.

The second degree of freedom in the entrance and exit guide mount is permitted by the mounting hole in the chassis, which is somewhat larger than the diameter of the machine screw that secures the guide to the chassis. By moving the guide in the direction shown by the arrow in the top view, the scanner wrap angle is increased and overlap is also increased as discussed in earlier section. Thus the two tapered guides at the entrance and exit of the scanner have to be adjusted with great care.

During the technicians alignment procedure, mechanical fixtures are used to locate the guides and set rough angles. But the final adjustment is made using a prerecorded precision standard tape. Final adjustments are then made to obtain a flat RF envelope during playback of this precision tape. An RF envelope that meets the tolerance for flatness, as shown in Figure 9, has the tape at the right altitude at all points of scanner contact. In addition, the audio/control-track head stack is at the right distance downstream from the scanner.

While the entrance and exit guides play the major role in determining tape altitude as tape turns and leaves the scanner, it must be remembered that other factors can affect tracking by causing errors in tape altitude either before or after these key guides. On the input side, for example, an error in the perpendicularity of the erase head can cause tape to flow upwards or downwards as it approaches the entrance guide. The same is true of the tape guides.

At the exit side of the scanner, a tilt of the audio/control track (12) can also to change the direction of tape flow. For example, if the top of the head stack were tilted downwards as shown in the lower part of figure 8, tape would be forced downwards at this point. Another factor is the parallelism of the capstan and pinch roller. Unless the pressure applied by the pinch roller is uniform across the width of the tape, the pinch roller can act drive tape upwards (too much pressure on the bottom) or downwards (too much pressure on top).

A change in tape altitude that grows with time, ending with tape curl at some stationary guide point is symptomatic of this form of error. Finally the height of the reels themselves must be correct to ensure that tape starts out and ends up at the correct altitude.

Before we leave figure 8 make note of the positions of the stationary heads in the tape path, as the sequence with which tape passes each unit in common in not only the FV606 but all VTR's. The erase head stack (3) is located on the entrance side of the scanner, between the entrance guide and the hold-back tension arm.

The audio/control-track head is located between the exit guide and the capstan. This head stack records and plays back audio signals as well the servo timing signals employed by the scanner servo system.

WWATS ATV REPEATER VIDEO SAMPLER

Louis Hutton K7YZZ

During the bench and on-the-air testing of the 434/923 MHz. WWATS ATV Repeater the output of the system was originally monitored from a video port on the transmitter exciter. When the 45 W Power Amplifier was added to the machine and tested on the air I found that what was really needed was a way to look at the actual video signal being delivered to the antenna.

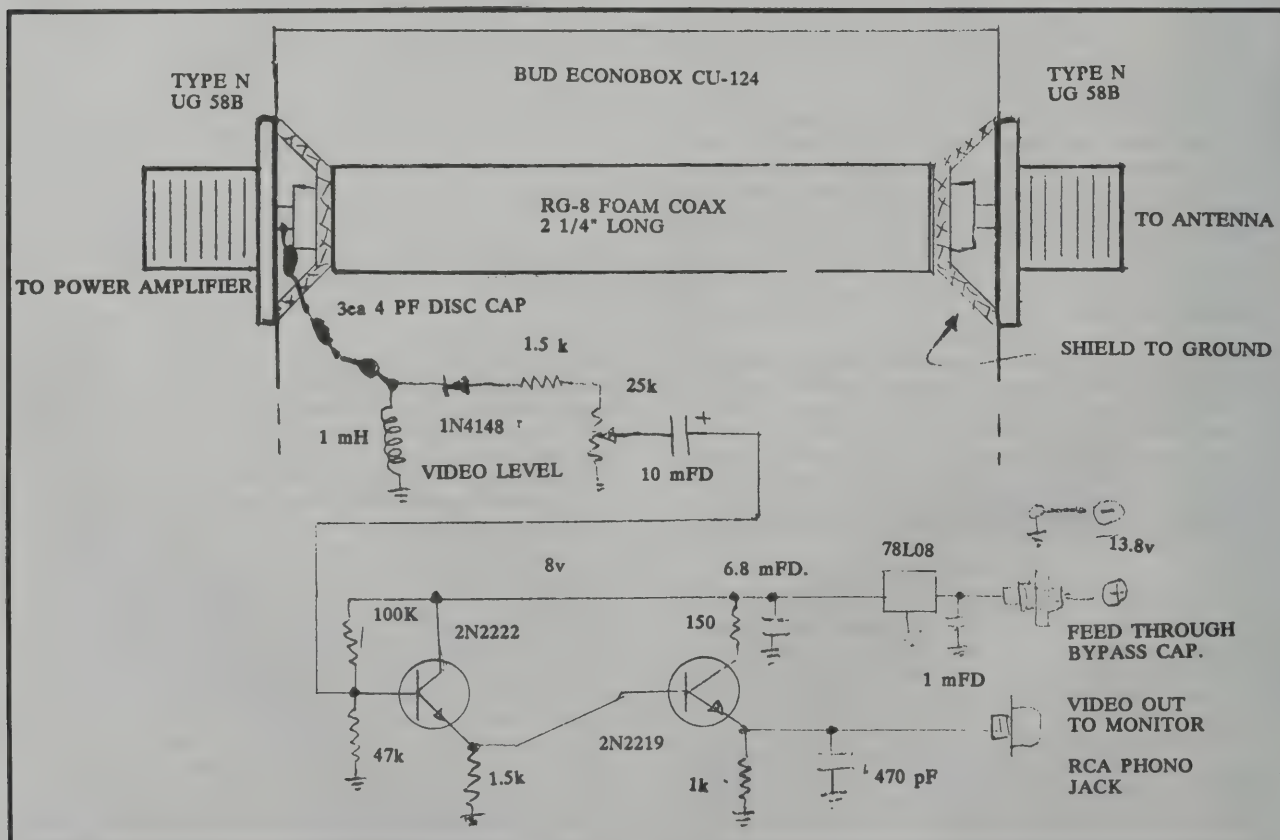
Looking through the literature that came with the driver amplifier from Pauldon Associates I found the description of a Video Sampler Model PD-VM. An order was placed for one and when it arrived I installed it in the repeater machine and powered it from the main DC power supply.

The video output from the sampler was fed to a oscilloscope and sure enough the sync pulse stretcher in the P C Electronics exciter needed resetting in order to get the correct looking vertical sync on the scope. The PD-VM has an internal adjustment that sets the video level to the monitor. It also has a relative output level meter which also has an internal control adjustment. I decided to build my own version

of this fine little unit and leave off some of the features not required for permanent installation in our repeater machine.

A Bud Econobox CU-124 was purchased and a second video sampler was constructed. I mounted a small 25 K pot on the side of the box with an external control knob so that the video level to the repeater monitor could be adjusted. The relative level meter was deleted from the circuit. The little unit was given two coats of grey paint and rub on lettering was applied to identify functions. The circuit was laid out on a small perf board and mounted on metal standoffs. When I first tried out the unit it gave me a negative picture on the video monitor. Sure enough I had accidentally wired the diode in backwards!

The little unit is now installed in the WWATS ATV repeater machine and is working just like the original PD-VM. I have added that original Pauldon Associates PD-VM to my stock of video test equipment.



K7YZZ

Schematic diagram of video sampler (modified PD-VM) as used in the WWATS 923 MHz. Repeater.

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POWER AMPLIFIERS

1.2 Ghz.

P.A. - Listed below are in diecast boxes

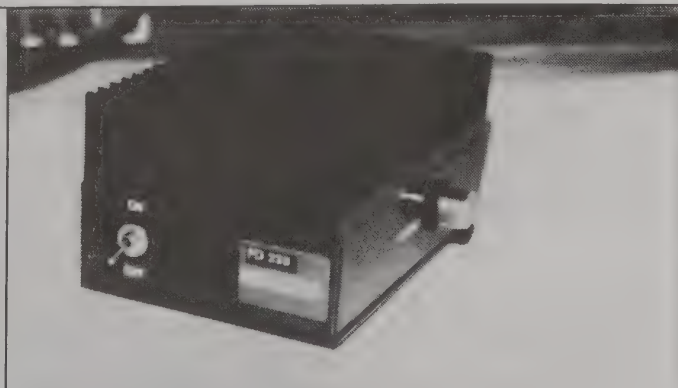
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This unit picks up your transmitted ATV signal by sampling the transmission line with negligible insertion loss. It uses 2 "N" connectors for input and output connections. A BNC is used on the video output. The detected output is connected to your monitor and scope so that you may accurately adjust your transmitter for proper video & sync levels. We provide two different models. Both have relative power output meters, but one has a greater accuracy. There are 2 external controls, one for video level and the other for power output on PD-VDI. This beats an on the air adjustment.

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WWATS ATV REPEATER VIDEO SAMPLER

Louis Hutton K7YZZ

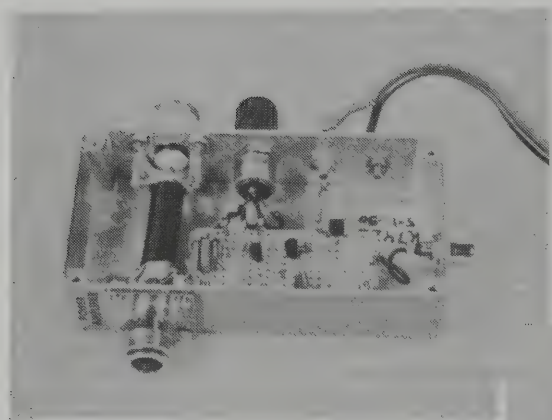
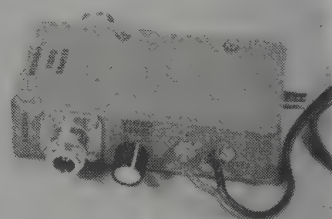


Photo left: inside the completed video sampler unit.

Photo below: completed home brew unit pictured with modified commercial unit.



Photos by K7YZZ

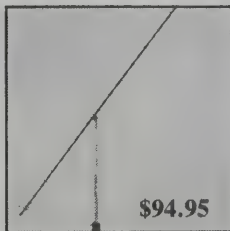
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VSWR	1.33:1 415 - 450 MHz
E-PLANE BEAMWIDTH	23 DEG.
H-PLANE BEAMWIDTH	24 DEG.
SIDELobe ATTENUATION	
1st E-PLANE	17.5 DB
1st H-PLANE	15.5 DB
IMPEDANCE	50 OHM
F/B RATIO	22 DB

MECHANICAL SPECIFICATIONS:

LENGTH: 14 FT.
BOOM: 1" OD 6061 T-6 AL
ELEMENTS: 3/16" AL ROD
ELEMENT INSULATORS:
BLACK DELRIN
COAX CONNECTOR: N-TYPE

* 436MHz

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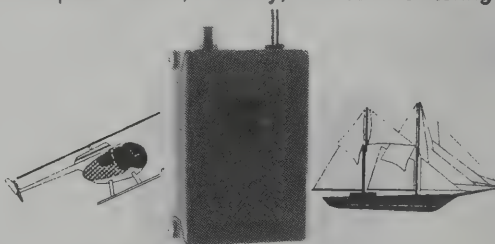
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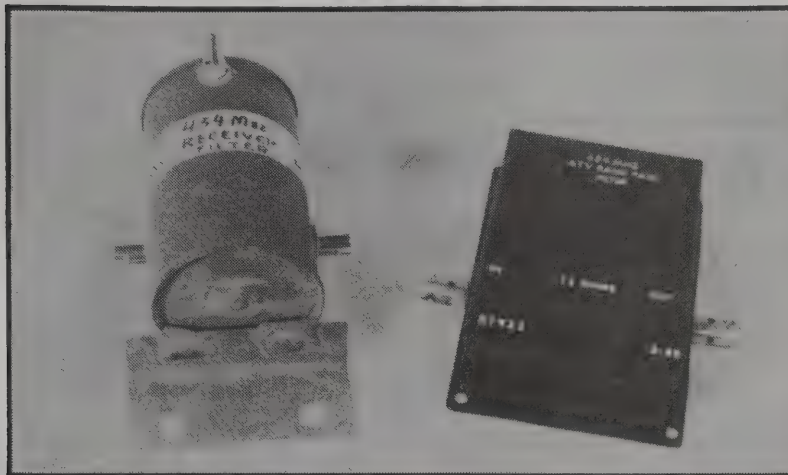
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WWATS ATV REPEATER RECEIVER ANTENNA FILTER

Louis Hutton K7YZZ



When the on-the-air testing began with the WWATS 434/923 MHz. ATV Repeater Machine one of the first things observed was that we were receiving considerable interference from a powerful local commercial UHF TV station on channel 22. Several different filter designs were tried to remove this signal with varying results.

The first thing I tried was a simple filter made up from a BNC "T" fitting inserted in the antenna line with a half wave length piece of RG-58 coax connected to the other leg of the "T" fitting. The open end of the coax was carefully trimmed while watching the receiver video monitor for elimination of the interfering signal. That worked pretty good, but I felt that this was not what I wanted to install outside next to the antenna exposed to our wet weather here in the Pacific Northwest.

The second filter tested is the juice can filter seen on the left side of the photo. The can is 2 5/8" by 4 7/8" with a 3/16" center conductor soldered to the bottom of the can. A tuning capacitor of 5-25 pf is soldered from the top of the center conductor to the outer top rim of the

can. The input connector center lead is soldered to the center conductor about 1" from the bottom of the can.

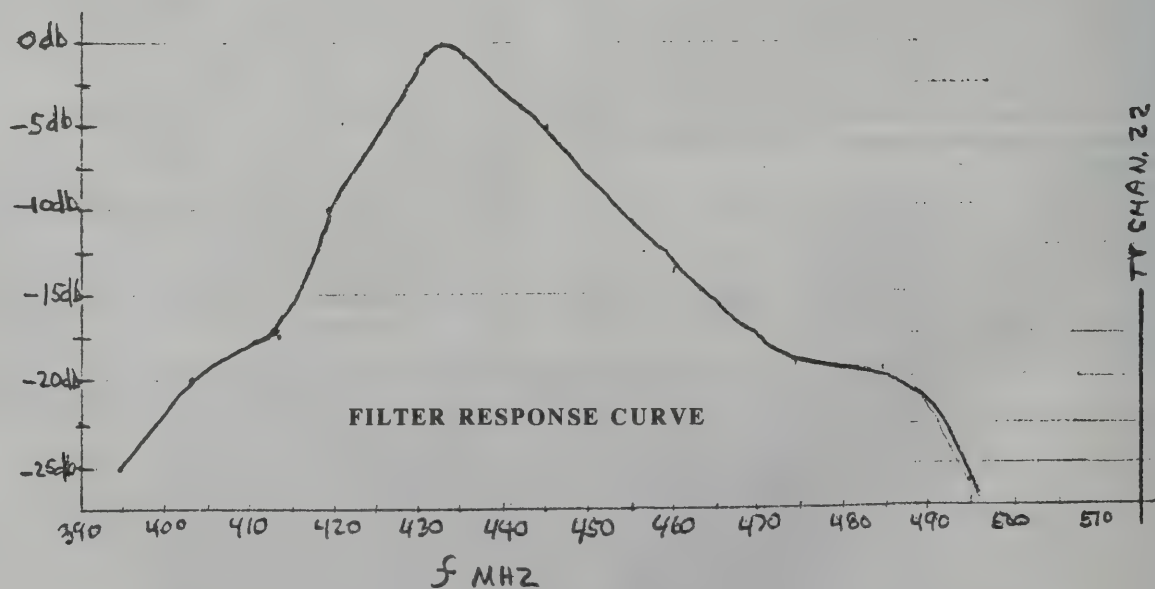
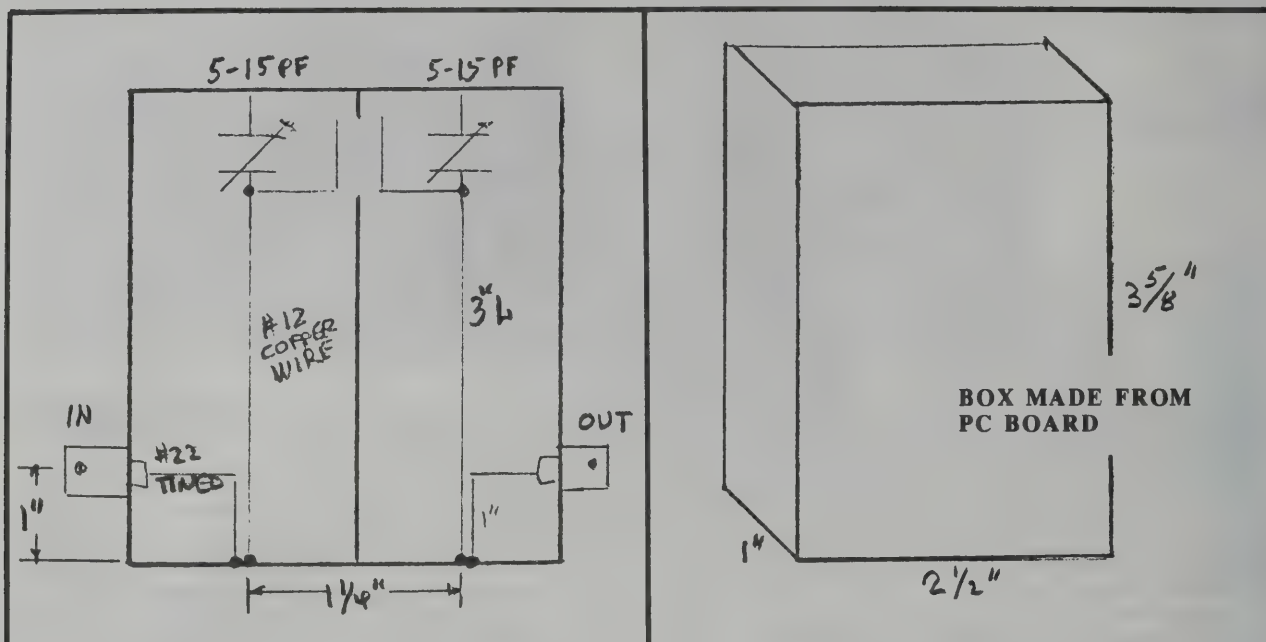
The output connector is link coupled to the center conductor with the bottom of the link soldered to the bottom of the can next to the bottom of the center conductor. This filter worked even better than the first filter, but here again it was not suitable for use in an outside environment.

A third two section band pass filter was constructed as shown in the photos and sketch. It's response was quite satisfactory and is of a physical size such that it could be mounted inside the down converter box on the tower next to the 434 MHz. Beach Ball Antennas. It was given its final tuning by tweaking the tuning condensers while monitoring a weak incoming ATV signal on the repeater's video monitor. Without this filter the system is bugged with signals on frequencies far removed from the desired 434 Mhz ATV band. Those two stacked Beach Ball Antennas are very broad band and being omni-directional they really pick up all sorts of signals along with the 434 MHz. ATV signal.



WWATS ATV REPEATER RECEIVER ANTENNA FILTER

Louis Hutton K7YZZ



434 MHZ. BAND PASS FILTER USED IN WWATS
434/923 MHZ. ATV REPEATER BUILT BY
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The w6ORGy Notes

By Tom O'Hara, W6ORG

FCC CERTIFIED NO LICENSE REQUIRED 33 CM ATV GEAR IS HERE!

Yes we all knew it was in the works since the new part 15 rules came into effect. It just took time for companies to finalize the designs, get geared up for production and submit the data to the FCC. The ads were out early before the product was on the shelves in anticipation.

Besides the wireless TV broadcaster applications to transmit the VCR or cable video to any TV in the house, I can see this as a cheap repeater or remote base system where it is used like the Kreepie Peepie. Only with this system I could transmit from the camera anywhere around the house to the fixed 70 cm ATV transmitter. Or maybe even to the motor home with its better mobile antenna system and power for public service events.

I saw and ordered one from the DAC catalog advertised as a *Pirate TV Broadcaster* for just over \$100 when you got done with shipping and handling. I got two notes that they had not come in yet before they finally shipped a month and a half later. I think there is an FCC policy that says that no manufacturer gets certification on the first pass.

Under the new part 15 rules for intentional unlicensed emitters, a device can be certified if it does not exceed 50,000 microvolts per meter of antenna measured at a distance of 3 meters. Also the device must incorporate a fixed antenna that is not easily removed and changed by the user. Otherwise the field strength limit would be exceeded.

This field strength limit translates to an effective range of about 100 feet. This is fine for the intended use of these devices with interference possibilities fairly low except for those next door.

But if the person next door is an ATVer with 1 to 20 Watts on 33 cm, it can cause some problems all over the neighborhood. There is a statement on the bottom of the devices that says that its operation may not cause any harmful interference, and that it must also accept any interference.



UNIVERSAL "Inner View"™ VM9900 33 CM ATV SYSTEM

Those areas using 33 cm as a repeater output will be most affected. However these transmitters are set for 910-918 and the most common repeater output is 923.25. If you do receive interference, you can ask them to readjust to the low end.

The transmitter is likely to be left on continuously due to the warm up time requirement and low current draw. In fact that is the suggestion in the user instruction booklet.

Sure legally you as a ham can interfere with them and they cannot interfere with you. But on a practical level, I can guess the reaction of the neighbor who has spent \$100 and is told by you that he cannot now use it.

Unless we can handle the interference cases diplomatically, it may come back on us in the form of reopening the local antenna ordinances or public nuisance laws. I will be interested to see what comes of this.

THE UNIVERSAL V9910 33CM DOWNCONVERTER

I was quite surprised as to how much was put into a low cost, mass produced device that seems to be of good quality. Naturally I took it all apart to see what made it tick and to make some tests. I needed to remove the quarter-wave spike to go in with coax from the signal generator.

To remove the quarter wave spike antenna, you need to remove the 4 screws on the bottom plate and lift the plastic cover off. Then remove the nut on the F connector and the two screws holding the downconverter

module can and lift it out. Now bend the tabs on the bottom can covers to remove them. You will see the screw that is holding the antenna.

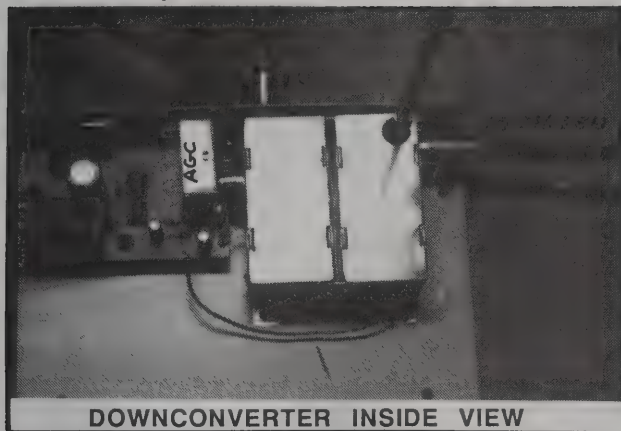
There is a RCA phono jack right next to the spike antenna that is used by the manufacturer to tune the downconverter up. It is connected in parallel so you can simply run a coax out to your own antenna from it instead of the spike to get more range or even tune the band for other 33 cm ATVers or neighbors who left their camcorder on in the bedroom.

The downconverter varicap tuned 900 to 930 MHz to channel 3 with the knob on the top of the cabinet. The bandpass filter in the output is wide enough to include channel 4 if 3 is active in your area. Conversion gain was 18 dB up to about -60 dBm (200 microvolts) where an AGC circuit takes over to reduce it by loading the output.

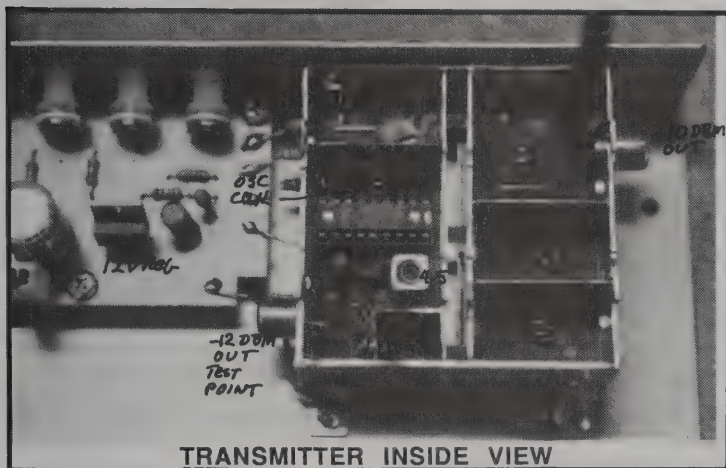
This unique AGC circuit is in its own little can and plugged into the side of the downconverter can through another RCA phono jack. I think they found that the AGC was necessary to prevent overload when the transmitter is placed close to the receiver.

Warm up drift after 5 minutes was .5 MHz and then settled down. The info sheet says to let the system stabilize for one hour but I found that that applied more to the transmitter.

Both units operate from 15 Vac wall plug transformers, but I did note that the output went to a bridge rectifier and then to a 12 Vdc three terminal regulator. That means you



DOWNCONVERTER INSIDE VIEW



TRANSMITTER INSIDE VIEW

could also go portable by taping 12 Vdc from a battery on to the output pin of the regulator IC. However, you will have to retune ever-so-often as the battery voltage drains down. To tap into the regulator input, you would need to have at least 14 Vdc since the regulator needs at least 2 Volts across it to work.

THE UNIVERSAL V9900 33CM TRANSMITTER

The transmitter came apart the same way as the receiver and also had the RCA jack test output. I measured a little over +10 dBm (10 milliwatts) RF carrier output from the RCA jack which is in parallel with the spike antenna. There is another jack on the opposite side that seems to be a test jack to set the frequency or other modulator functions that had about -12 dBm output.

It does take the full hour of warm up for the frequency to settle down. It went from 913.5 MHz at turn on down to 909.45 after one hour. There is a rear panel tweaker pot that allowed

tuning it from 909 up to 916 MHz on this unit.

You can move it further by squeezing (lower) or widening (raising) the spacing of the 1.5 turn coil connected to pins 3 and 7 of the Siemens TDA 5660P modulator IC. I do not recommend it unless you have a frequency counter as you could tweek it out of the band and might illegally interfere with other services if connected to another antenna.

The sound frequency is set by a coil in a shielded can connected to pins 17 and 18 but did not seem to drift much. The IM is so low that the triple beat crosshatch from the sound being off frequency that it cannot be seen in the picture.

Note the clean spectrum analyzer picture of the 100% modulated video multiburst with sideband harmonics in the grass at -50 dBc. The Modulator IC is followed by 3 low level linear amps to get to the 10 milliwatts. The high frequency response was rolled off a little. Sound subcarrier was -19 dBc. They suggest in the user info



TRANSMIT SPECTRUM

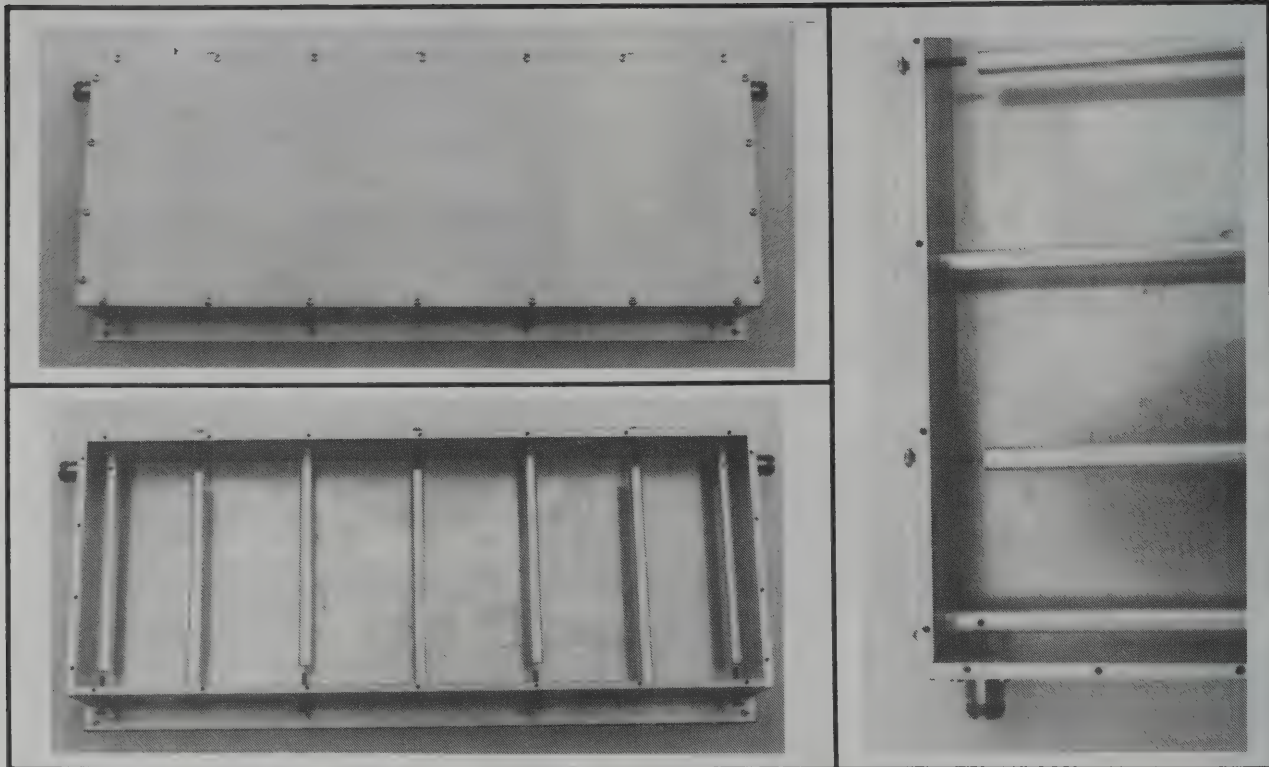
that there are two settings, close together, that will give a clear picture, but only one of these will also give clear sound.

The video input is the standard 1 volt peak to peak. Line audio gain seemed a little low to me for 25 kHz deviation. It took 1.7 Volts peak to peak audio input with the gain pot full up to get the full deviation.

You cant beat the price of these little wireless TV broadcasters and who knows what applications Hams and other people will put them to or how the interference potential will manifest it self. It should be interesting.

On the positive side I can see where it could get more hams into wanting to transmit farther than 100 ft and get them into "real" ATV or ATVers making a mini repeater or remote base. I will be interested in your feedback.

I was so impressed with this little inexpensive TV system that I have added it to our product line. But there are at least 8 other manufactures getting FCC certification that I foresee a wide variety of units and prices at local stores not far away.



INTERNATIONAL CRYSTAL HAS BEGUN PRODUCING THE 70 CM VSB FILTER

In past columns I asked for someone willing to go into production of the VSB filters that appeared in the April 89 issue of ATVQ by Lyn Cyr, W1NRE. I received lots of positive feedback from those who built them for their repeaters, but were hesitant about supplying them to others.

Royden Freeland, WB5KDC, President of International Crystal Mfg, got involved in the building of the Oklahoma City ATV repeater and indicated that he might also be able to make them in his crystal factory machine shop.

He sent me his prototype to check out, which appears here. I was quite impressed with the results. The insertion loss at the 439.25 MHz carrier frequency was a miserly .7 dB. This is a half dB better than the high quality TX-RX Systems VSB filter. Through the whole VSB video passband the insertion loss did not exceed 1.0 dB!

Out of band attenuation was >80 dB +/- 12 MHz from the VSB passband. Attenuation at the LSB sound subcarrier frequency was 30 dB. This means that the worst case

LSB sound will be down >45 dBc if set at the maximum -15 dBc USB level given equal DSB modulation.

The return loss (another way of stating VSWR and a measure of how well matched to the cable as well as taking into account all losses) was -18 dB worst case within the VSB passband at one end, and 10 dB at the other. Since I measured it right at the filter, the worst case VSWR was therefor less than 2:1. But if the -18 dB return loss end was marked as the transmitter end then it would only be a VSWR of less than 1.3:1 at the transmitter output.

In discussing it with Royden, he seemed to think it was a function of the tap point at that particular connector, and could be better matched in test from that of the prototype. Tightness of the covers had quite an effect on all the parameters I noticed as I was putting it back together and sweeping it at the same time.

I was really surprised at how well the filter worked when it is just bare aluminum sheet and bar stock. I know the old Spectrum International

interdigital VSB filter had to be copper plated to get it down from 4 dB to 2 dB insertion loss, and the depth and quality of plating was quite a variable.

The size is about 20x7x2 inches. There is plenty of space between the end of the rods and tuning screws that the filter did not arc over even at 500 Watts input. I sent it to Henry Ruh, KB9FO, for destruction testing with his Henry amp. He has always been good at that, and since it passed through his hands in good shape, it should be indestructible anywhere, hi.

Tuneable range is about 6 MHz without changing the dimensions. So it looks like ICM has to make 2 sets of parts to make one that will accommodate 421 to 427 MHz and the other for 434 to 439 MHz VSB filters. After pricing out for 100 sets of parts Royden determined that he would have to get about \$250 for the filter to make it worth while. Call him at (405) 236-3741 if you need one of these excellent VSB filters for your ATV repeater.

I WAS WRONG ABOUT VSB

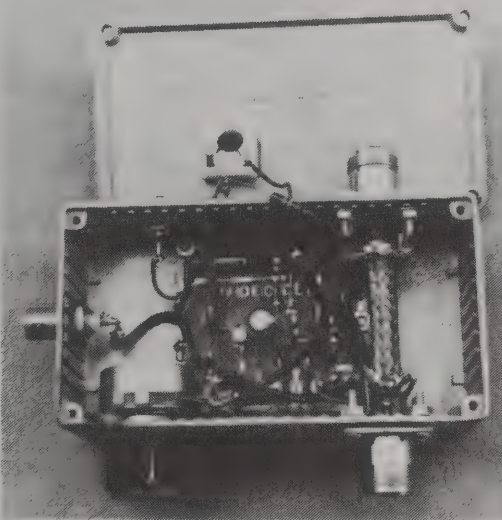
Yup, hard as it is for me to admit being wrong unless there is hard proof, a fellow ham, member of the SCRRBA Technical Committee, Robin, WA6CDR, told me that the FCC VSB commercial broadcast regulation is not the -42 dBc for the lower sideband sound subcarrier as I interpreted it from figure 5a in part 73.699 of the Rules.

He pointed out that if I had read the fine print on how that performance test is made (73.687), I would have seen that it is not in reference to the peak envelope power, but rather to a .5 Volt peak to peak sine wave impressed about a dc level of .5 Volts assuming a sync peak to peak voltage or equivalent of 1 V peak to peak. The sine wave is varied from a reference frequency of 200 kHz (-18 dBc) to 4.2 MHz.

What this means is that the VSB energy of the LSB color subcarrier must be -60 dBc, not -42 dBc. All other energy must be -20 dB below that of the 200 kHz reference modulation beginning at 1.25 MHz below the carrier frequency or -38 dBc in the test case. They single out the LSB color subcarrier since it is the major power frequency in the video. The Rule assumes a separate sound transmitter which would not appear as a lower sideband.

So technically in the definition of VSB as it applies to UHF broadcast low power TV, which is the commercial practice similar to what we would run if you want to talk standards, the VSB filters we use on the antenna lines in our ATV repeaters, or areas that require it due to potential or feared interference, probably do not meet the spec. This is a practical fact given the available VSB filters which are down about 20 to 30 dB at the LSB color frequency. Normal unfiltered DSB and USB component of VSB video has the fully modulated color at -22 dBc and sound at -15 dBc.

For the purists and fanatics, or those repeaters outputting on 421.25 with a federal government system near by on 416.75 or 417.675 MHz, an additional 20 dB suckout filter might be the way to go.



PAULDON RELATIVE POWER AND VIDEO SAMPLER

I was sent a prototype from Don Fuller, W2WHK at Pauldon Associates to check out with the Mirage power amps. I am not aware of any other commercially available video detector/monitor for power amps. They are easy to build into the Diamond SX1000 as we pointed out in the last issue or the more involved one on page 28-8 in the 1990 ARRL Handbook but this is a way to go for the operator or impatient.

The Pauldon Video Sampler is built into one of the smaller diecast aluminum boxes with 2 N connectors for RF in and Out, a BNC for composite video out to a monitor or scope, feed thru cap for + 12 Vdc that goes to the video line driver.

There is a microamp meter for indicating relative power. The two pots are for setting the peak power at full scale on the meter when going thru the amp blanking pedestal setup and the video lever output to 1 volt peak to peak into a resistive 75 Ohm load.

I first checked for any insertion loss and found it negligible on the spectrum analyzers most sensitive 1 dB/cm scale. Then a look inside for a look at the circuit and construction. As are most prototypes it was the usual rats nest, solder blobs and substituted available parts. With the exception of more than desirable frequency roll off and sync rise time, it still worked fine.

I connected up a TC70 and Mirage D26N and fired it up. This unit had a fixed resistor instead of the 100K pot so I could not set the full scale reading on the meter, but it did read sufficiently to make the set up. The video out to the monitor and scope was easily set to 1 volt pk-pk and the video to sync ratio verified out of the 50 Watt pep amp.

Although it does not affect the primary purpose of this device of monitoring a power amps RF output and video to sync ratio setup, I felt that the multiburst showed excessive roll off and sync rise time checking it against my old DM-1 in the coax line. This may be due to the 5K wirewound video gain pot used instead of a carbon 1.2K as shown in their schematic. I would also suggest a 1N5711 hot carrier diode bypassed by a 5 pF rather than the 1N4148 and 10 pF they used, to improve it.

A 1 pF cap is used to tap off some RF from one of the N connectors. This goes through a detector diode. The detector output goes both to a 100 microamp meter and through a pot to a three transistor inverting video amp. A three terminal 8 Volt regulator supplies a stable voltage to the video amp.

VERTICAL ANTENNA SHOOT OUT

I had mentioned that Ireland Antenna was sending me an 8 ft stick to test out. While talking to Merit at RF Parts, he asked if I would like to check out some of the Diamond multiband antennas at the same time.

My tests are no substitute for those that are set up at Dayton or the VHF/UHF conferences, but are probably good to within 2 dB and show relative differences between a variety of types of antennas.

A little project turned into a big one but that's one of Murphey's many laws. I also wanted to see what the bandwidth of the antennas were which is more important to ATVers who utilize both ends of the bands.

I set up with my old reliable ground plane as the source antenna connected to my Wavetek Sweep Generator cranked up to +10 dBm. At the test antenna end I connected to the HP Spectrum Analyzer.

First I verified the amplitude flatness across the 420 to 450 MHz band with the broad band KLM 440-6X. The measured gain was close to 9 dBd and so I used that as a reference. And lastly verified it at the end to make sure nothing had drifted.

The readings were taken at the same distance with the best peak amplitude noted when slightly tilting around. While this gives the gain of the major lobe, it doesn't exactly tell you what it will do straight up on the tower. But that's another article.

I also swept each antenna for return loss or VSWR. Gain and VSWR are some what independent. You can have a high VSWR with little drop in gain.

IRELAND TUNE-TENNA

I tested two antennas from Ireland, the first was a little antenna designed for 440 HT's. It had the same unity gain, size and full bandwidth as the AEA Hot Rod. But the difference is the tuned sleeve at the feed point that seemed to act like a coax sleeve which keeps the RF from flowing back down the outside of the coax. This might be a good one for Kreepie Peepies that have no real ground plane and have camera RF susceptibility problems.

IRELAND FI-4408-A Colinear.

The stated gain is 15 dBd, but I measured 6. It comes with about 20 feet of RG58 which could account for a few dB. I suggest cutting it off to a few inches and putting on a type N. It is very well made of tapered laminated fiberglass 95" long. Very light weight. It's primary market is Marine, but also good for base or repeater use. VSWR was <1.2:1 at 435 and went to 2:1 at 450 and 425 MHz. Prices ? You can call Ireland for more info in Miami at (305) 633-7108.

DIAMOND U300 & U200

These are dual band 70 and 23cm antennas. When you don't have much space, want to save a coax lead, or work duplex in the field, these work great. The U300 is 8.3 ft long and the U200 is 6 ft. Construction is a fiberglass tube and is also well made for base and repeater use. Claimed gains are 8.6 and 8.3 dB at 70cm and 13.2 & 11.7 dB at 23 cm. The 70 cm gains were just about right on at mid band and rolled off 2 dB at 450 and 3 dB at 420. VSWR however was good at 440-450 at no worse than 1.5:1 but below that they went to 2:1 at 435 and worse to 420. So they were fine for 439.25 ATV or 440 FM. I did not look at the 23 cm performance. Prices are \$159 and \$119.

DIAMOND NR730R

This is a 3 - 5/8 mobile type single band rod collinear about 5 ft long. Claimed gain is 6.9 dB which again was just about what I measured at 435 MHz. But at the band edges it dropped by 6 dB. VSWR was <1.2:1 at 435 where I tuned it, but went to 2:1 at 440 and 425 MHz. So it could be tuned for a 10 MHz segment it looks like. This might be good for fixed-portable when you need some omni gain on a spot frequency. Price \$79.

DIAMOND NR-900

If you want 3 bands for portable public service work in one antenna, this one might be it. It covers 2 meters with 3 dB gain, 440 with 6 dB and 900 with 8.7 dB. Again Diamond seems to tell the truth with its advertised gain (refreshing) on 70 cm. However it also had a 10 MHz useable bandwidth. This one was set for 440 to 450. It's built similar to the

NR-730R and is about 3 ft long. Price is \$79.

Some other Diamond antennas worth mentioning are the F1230 23 cm base/repeater antenna used in crossband machines. Gain is 13 dB for \$169. The F718L covers 428 to 443 MHz with claimed 11 dB for \$229. Give Steve at RF Parts a call if you have questions on the antennas.

AMPLIFIER UPDATE IS NO UPDATE

Sorry to report once again that the TE Systems 180 Watt and AEA 50 Watt amps are still not out at this time.

TE says that their military business, especially with Desert Shield going on, is taking all their time but maybe next month?

AEA's marketing people at the San Diego ARRL convention last September told me two weeks, but a more reliable source says more like mid November. Further that the 50 Watt antenna mounted amp will also have a 1.5 dB noise figure 10 dB gain amp in it and all driven by a 28 Vdc companion power supply in the shack. The power supply will also have 13.8 Vdc to power the transceiver. The amps intermod reinserts the lower sideband sound at -30 dBc from their VSB transceiver. Price is expected to be \$695 for both items together as a system.

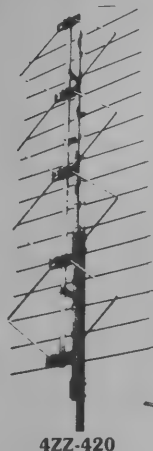
It is not too high a price if one compares it to a comparable non antenna mount amp system with a Mirage D100 amp, Astron RS20M power supply, and a Mirage KP-2 antenna mount preamp which would run you about \$600. Since the mail order amateur dealers almost never make you pay full list, the AEA system might come quite close in cost.

Actual power out to the antenna will of course depend on the coax loss where the AEA system might be desired in the longer feed line cases depending on the amps gain and the power drive available. Maybe we will have one tested out with the answers next time?

*73 es Happy Holidays
Tom O'Hara, W6ORG
2522 Paxson Lane
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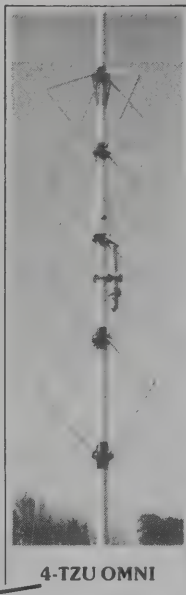
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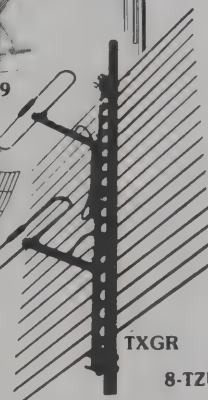
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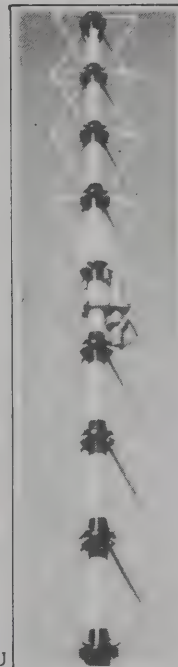
MDG-2717

LS4
LS8
LS16
SLOT



TXGR

8-TZU

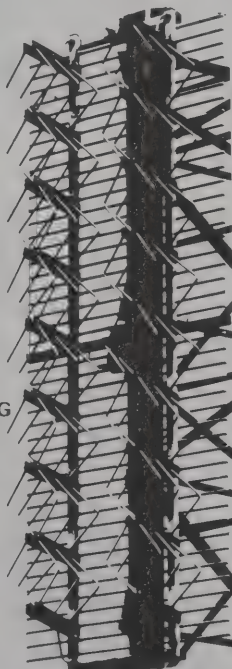


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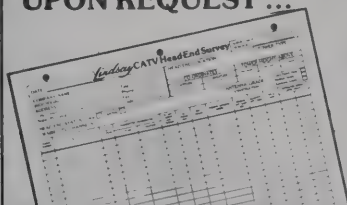


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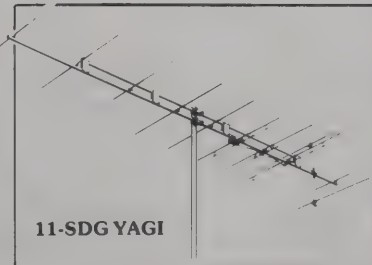
ZIG-ZAG
SERIES



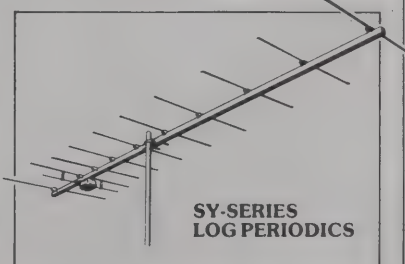
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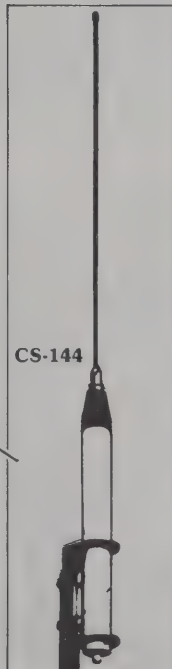
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WWATS 434/923 Mhz ATV REPEATER MACHINE

Louis Hutton K7YZZ



During a visit to the Wizards Cave (K7YZZ) in early 1988, Chuck Northcut K7SRZ asked if I would like to build an ATV repeater. At that time all of the ATV activity was being conducted on 434 MHz. as this is the only frequency that can be used in this area for video communication in the 400 MHz. band. We reviewed the options and decided that the input to the repeater would be 434 MHz. and the output would be 923.25 MHz.

A call was placed to PC Electronics and Hamtronics for some equipment to assemble into some kind of repeater configuration. Four basic modules were constructed consisting of a Down Converter Unit, a Receiver Unit, an Exciter Unit and MCW ID Unit. This set of equipment was interconnected into a basic repeater configuration and successfully bench tested.

It was decided after considerable discussion with other ATV'ers that the 434 MHz. receiver antenna system should be omni-directional with horizontal polarization, and the 923 MHz. antenna should be vertically polarized providing omni-directional coverage. Prior to this decision I built and tested all kinds of antennas. For the 434 MHz. receiver

mode, stacked Yagi's, Big Wheels, Alford Slots, Beach Ball, and Dual Quad antennas were constructed. The final receiver antenna configuration accepted consists of two Beach Balls stacked one above the other and fed with phased coax lines.

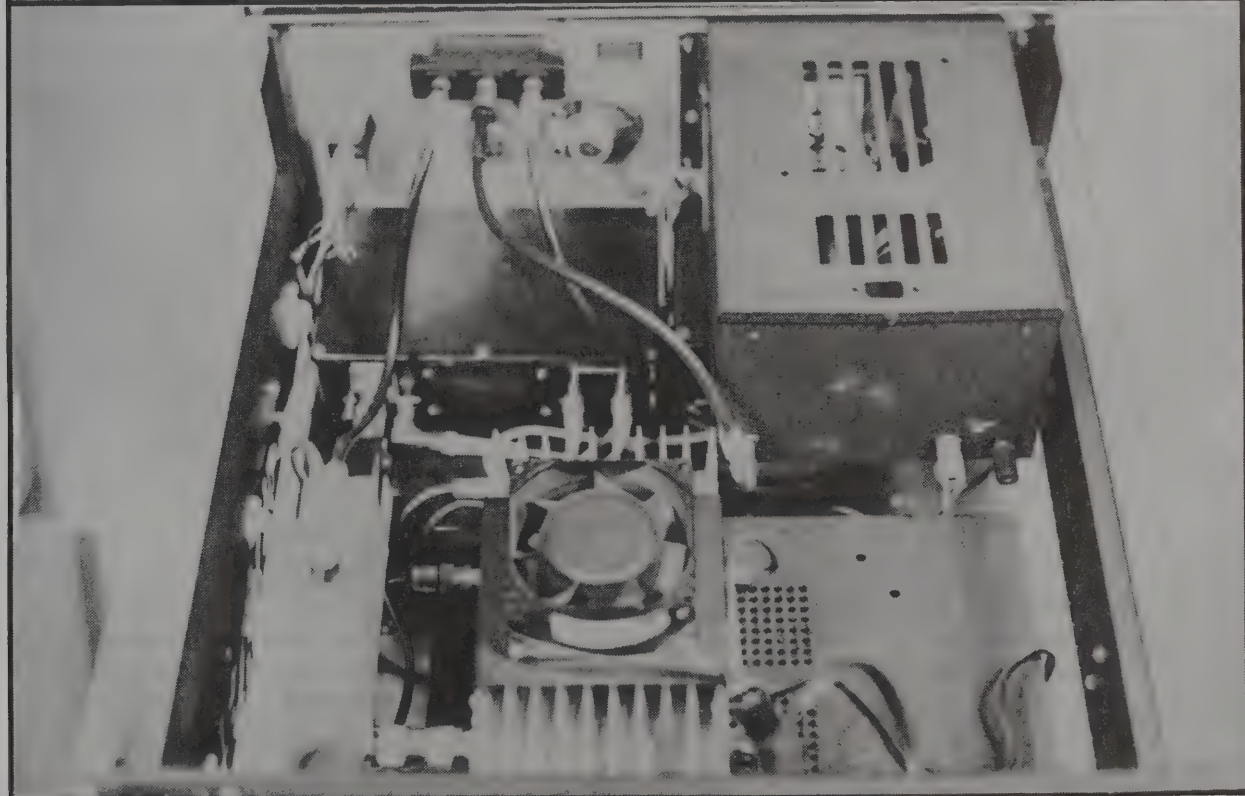
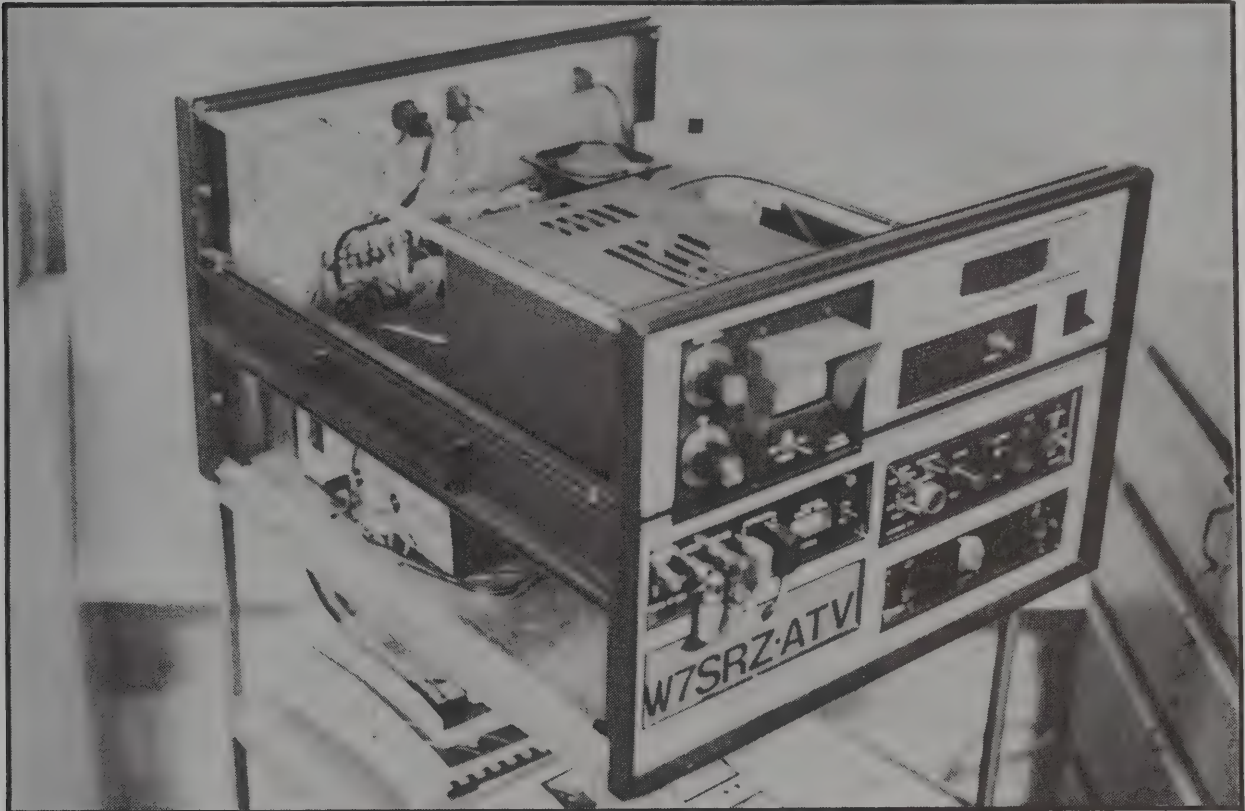
For the transmitting antenna on 923 MHz. I built and tested stacked vertically polarized Yagi's, Ground Plane, 5/8 Wave Gain Vertical, Beach Ball and Dual Quad antennas. After additional over the air tests, the antenna selected was a Model FP-19 Vertical Collinear Antenna manufactured by the Comet Co. of Japan.

From the early system tests it became very apparent that we were going to require much more power output than first thought. A 45 Watt 923 MHz. power amplifier was bought from Down East Microwave. During the bench test of the system I found that the Exciter Module did not have sufficient output to drive that new amplifier to full power output. A PD-33VLP Driver Module was obtained from Pauldon Associates which had more than sufficient power to properly drive that new amplifier. To set the power to the RF PA at the

ATVQ DEVOTED ENTIRELY TO HAM TV

WWATS 434/923 Mhz ATV REPEATER MACHINE

Louis Hutton K7YZZ



WWATS 434/923 Mhz ATV REPEATER MACHINE

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desired level the voltage to the drive stage was limited to 12 volts by installing a small 3 terminal regulator inside the Driver Module.

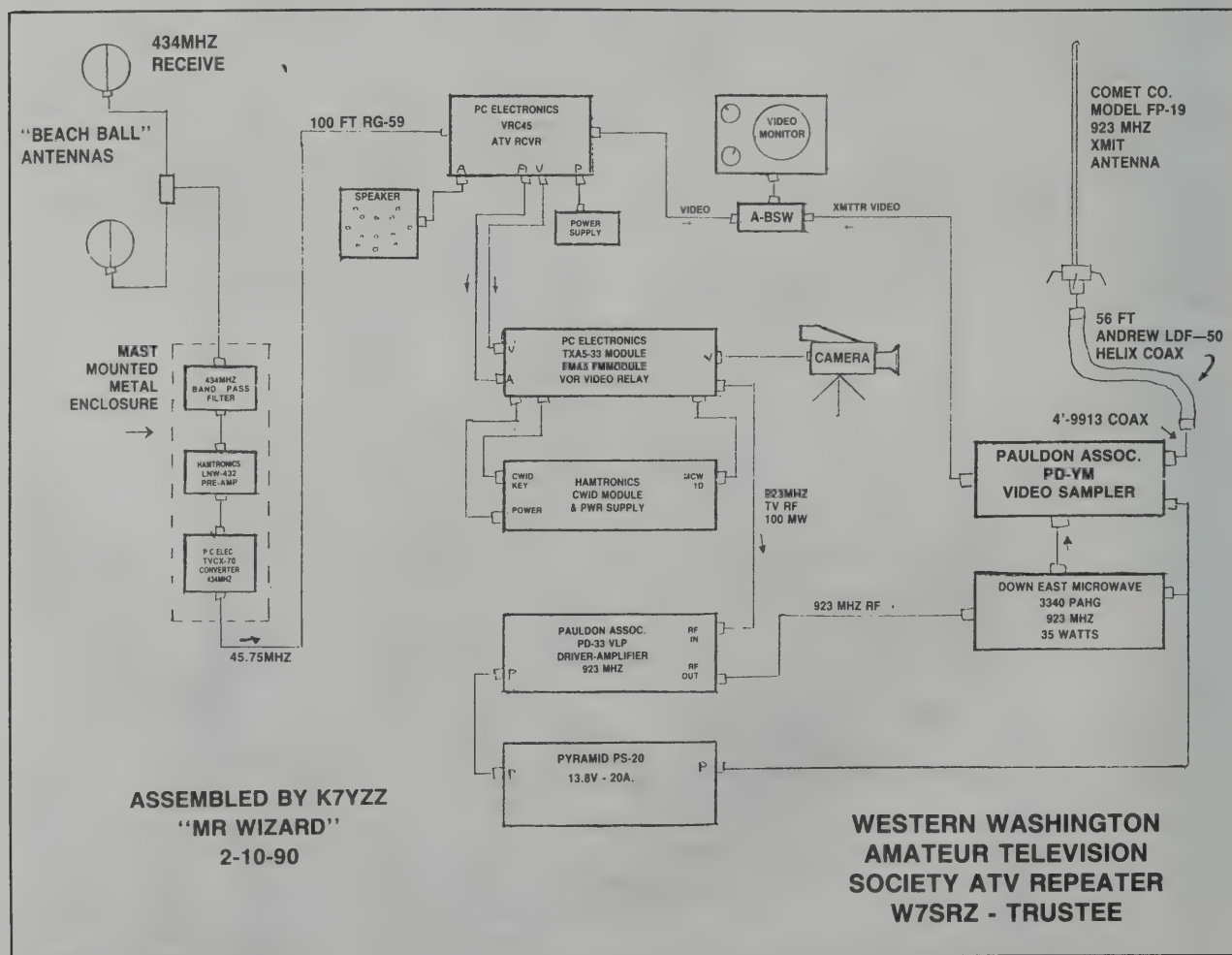
A video monitor is provided in the machine that is switch selected to monitor either the received or transmitted signal. Originally the transmitted signal was monitored at the exciter output, but on the air tests revealed that we should be looking at the output of the RF PA. A video sampler PD-VM was obtained from Pauldon Associates and installed. It proved to be just what we were looking for but it had several features that were not needed in our repeater system, so a modified version of that fine unit was built and installed in the repeater machine.

Originally the 923 MHz. feedline from the repeater to the vertical antenna was 9913 Coax. Tests showed that over half of our power output was lost in that cable. Some low loss Andrew Helix Coax type LDF-50 was acquired. Several homemade

cable connectors were fabricated based on an article in ATVQ for October 1989, page 19. Now we are losing less than 1 db of our power output through some 56 feet of that low loss coax.

During additional over the air system tests at various test sites it was determined that a local commercial TV station on Channel 22 was causing us some problems so a band pass filter was installed in the down converter box. A Hamtronics LNW-432 low noise pre-amplifier was built and installed to make up for any insertion loss of the band pass filter.

The construction of the 434/923 MHz. ATV repeater system for the WWATS group is completed and several possible sites are now being evaluated as a possible home for the equipment. The most noticeable thing so far has been the limited range of the transmitted signal as compared to the range of ATV signals of the same power level on 434 MHz.



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Special Club Offer
Page 5

A COLOR BAR TEST GENERATOR YOU CAN BUILD

Thomas Gould WB6P

Thomas Gould WB6P, first licensed in 1969. Obtained a B.S. in Electrical Engineering. I have worked as a Television Broadcast Engineer in the past and I am currently working for The Boeing Co. in Seattle, WA. My non ham interests include wood working, weight lifting, church and family.

With increased activity on Amateur Television and the availability of low cost components every station can have a dedicated color bar video test generator. This project will eliminate the need for a color bar test tape or your camera for video performance tests. The goal of this project was to provide a high quality video signal with low cost and a simple design. Thanks to large scale integration a complete video signal generator can be built using very few components.

RCA designed a complete one chip sync generator and Motorola has a video encoder integrated circuit that really simplifies the task of generating quality color video.

Uses: Color Bar Test Generator:

ATV Transmitter Performance Measurements

This project can be used as designed as a good color bar generator. Use it for transmitter setup and general purpose video testing. Monitor or Television Adjustments Use the video generator for Monitor setup or add a modulator and set up your television.

Color Encoder for computer. Use just the encoder section to generate composite video from your computer RGB and sync outputs.

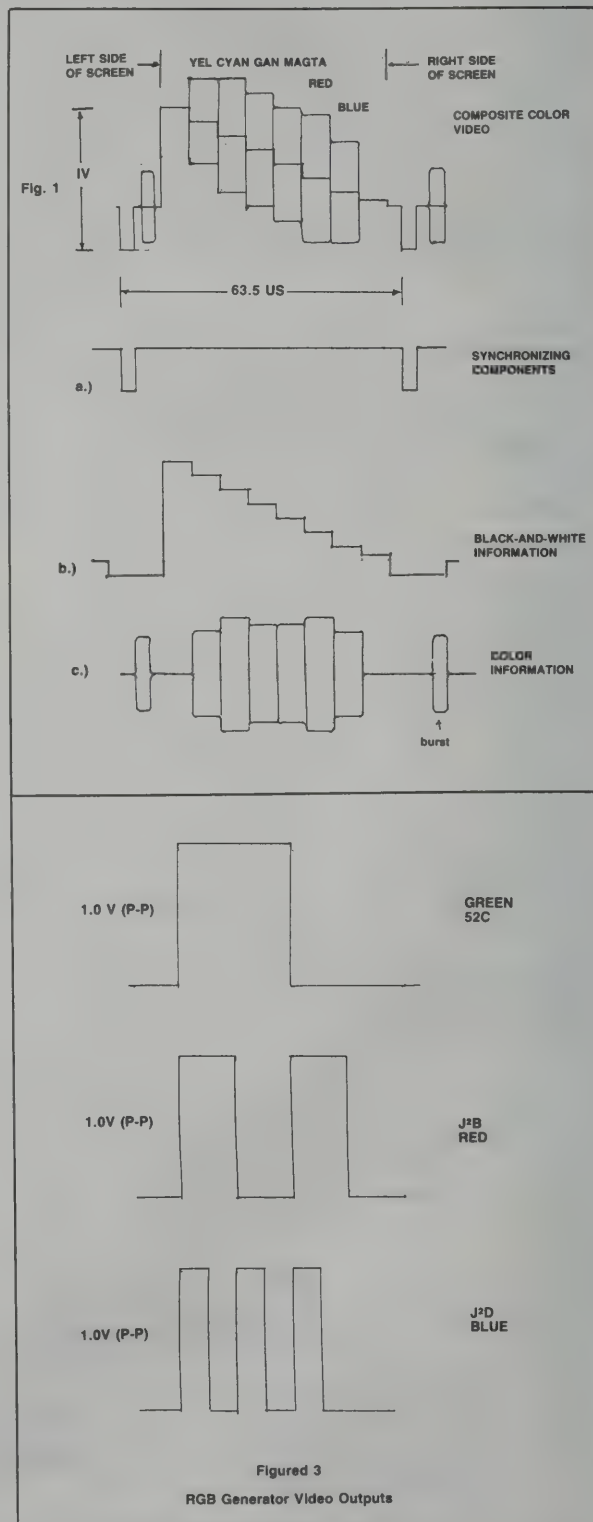
Video Primer Signal Information

The picture you see on a color TV is actually formed by three electron beams, one each for red, blue and green being scanned horizontally and vertically over the screen. As these beams are scanned, their currents are changed to create the light and dark areas on the picture tube face which form the image you view. Figure 1 shows the video signal during the time that it takes the electron beams to make one horizontal scan across the screen.

The video signal is actually a combination of three signal components which are required to form a complete color picture. The three components are scanning control information called synchronizing pulses, black and white information called luminance and color information called chroma.

Synchronizing Components

The synchronizing information is a series of pulses which tell the horizontal section when to return to the left of the screen to start a new line, and the vertical section when to return to the top of the screen to start a new frame. In the NTSC system each frame contains 525 lines. This is done



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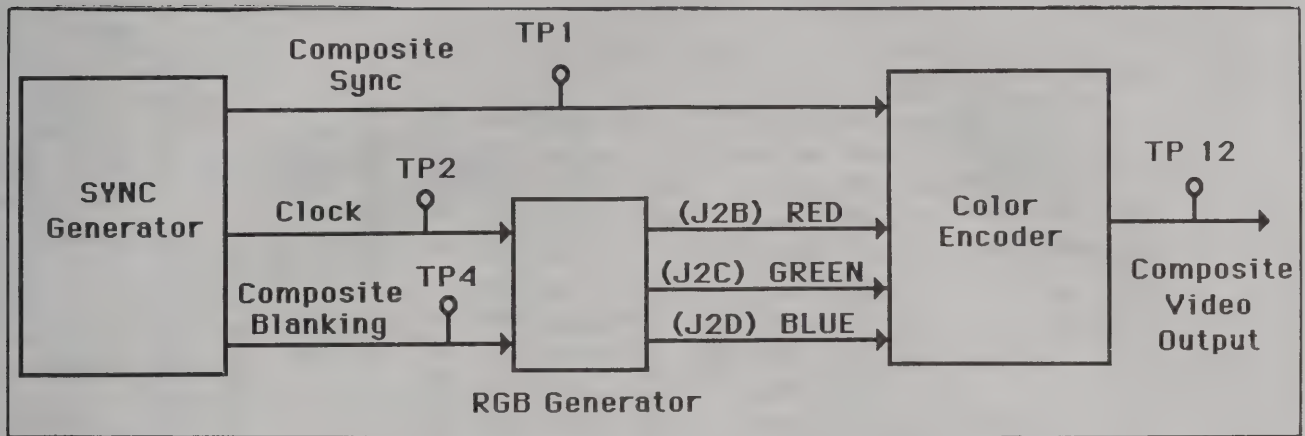


FIGURE 2. Block Diagram

by scanning the horizontal at approximately 15,750 lines per second, and the vertical at 30 frames per second (the vertical scan rate is actually 60 Hz, but it takes two trips, or fields, down the screen to complete one frame). The process of returning to start a new scan is called retrace or flyback.

Black & White Information (luminance)

This information determines the instantaneous brightness of the electron beams as they are scanned over the screen. In fact, it is all that is used for the single electron beam in a black and white TV set. A negative going video detector detects a luminance signal in which the negative signal extremes correspond to bright areas of the picture. Thus the waveform shown in Figure 1(c) would produce vertical bars of decreasing brightness from left to right.

Note that the output is at black during retrace so the electron beams will not be seen. The luminance signal is designated by the letter Y.

Color Information (chrominance)

The color information (which is ignored in a black-and-white TV) is made up of the red, blue and green signals required to drive the picture tube, minus the luminance signal. These "color difference" signals, designated R-Y, B-Y and G-Y, modulate a second subcarrier which has a frequency of 3.58 MHz. Although the type of modulation used on the sub-carrier is of a complex nature if boiled down to a simple result: 1. The instantaneous phase of the 3.58 MHz. signal determines what color will be displayed (hue or tint). 2. The instantaneous amplitude of the 3.58 MHz. signal determines how much color will be displayed (saturation).

An obvious question is the phase and amplitude of the 3.58 MHz signal relative to what? The answer is a short burst of 3.58 MHz. (simply called burst) which has constant phase and amplitude. The burst will be used to determine the tint and saturation of the color to be displayed. For the waveform shown in Figure 1(d) each bar would have a different saturation. The three video signal components are separated and sent to their respective sections in the TV according to the type of signal.

Theory of Operation

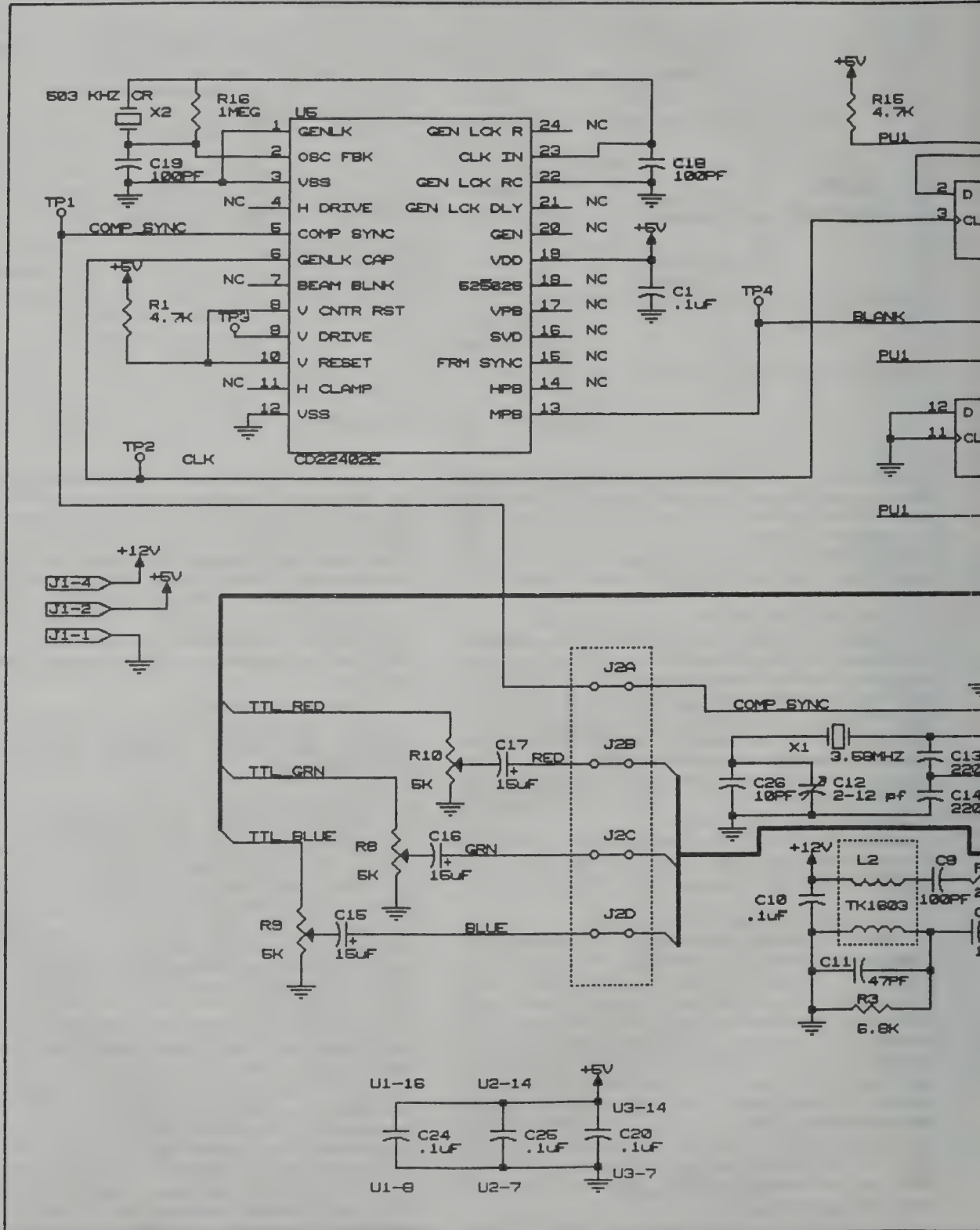
Refer to the block diagram of figure 2 to show the main components which make up the complete video generator.

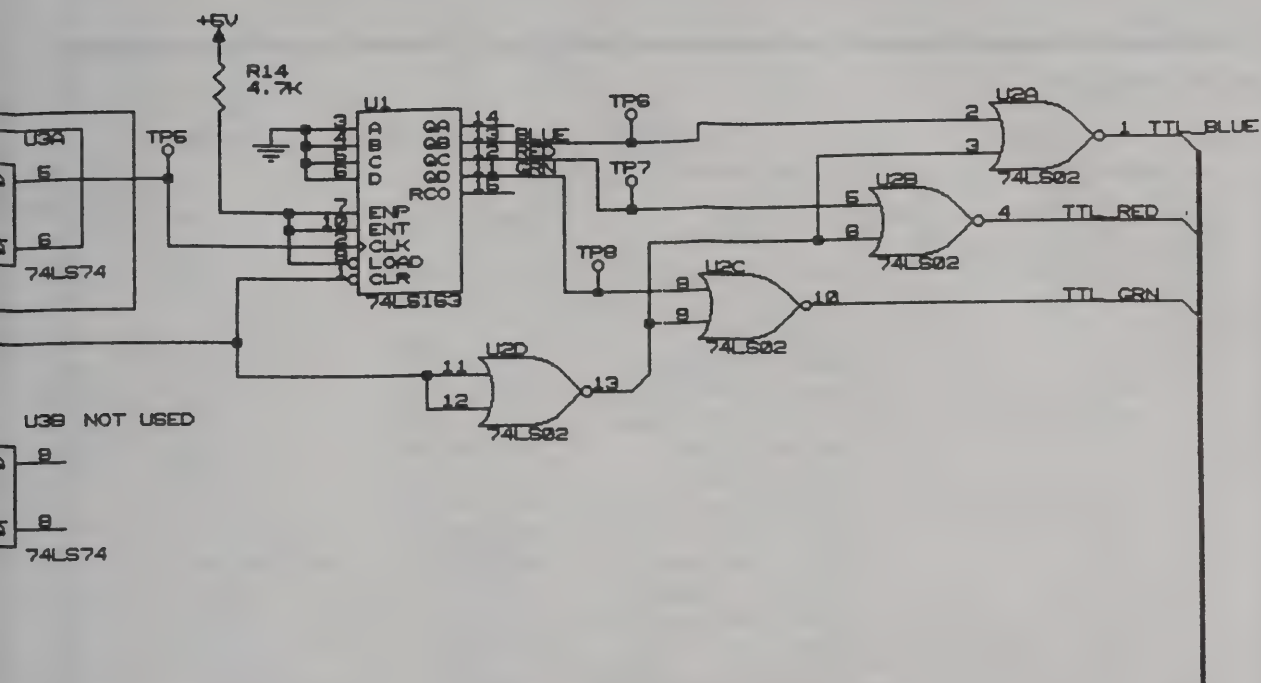
Sync Generator U5 is the Sync Generator that is used for providing the composite sync timing signals. The outputs used are composite sync, composite blanking and a buffered output of the sync oscillator. The sync generator uses the 504 KHz. ceramic resonator as a base oscillator then divides that signal by 32 for horizontal sync the oscillator is further divided to derive the vertical sync timing signals. These signals are all combined into the composite sync signal which is sent to the color encoder I.C.

RGB Generator U1, U2 and U3 make up the red, green and blue video signal that drives the video encoder section to make the color bars. One half of U1 is used as a divide by 2 counter which generates the 252 kHz. clock for the four bit counter U1. The non-inverted blue, red and green signals are the divide by 4, 8 and 16 outputs respectively of U1. The blue, red and green signals are inverted and blanking is added by U2. The TTL level is then reduced to 1V P-P by R8, R9 and R10. as shown in Figure 3.

A COLOR BAR TEST GENERATOR YOU CAN BUILD

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Appendix B. Parts List

Item	Quan.	Ref.	Description	Part No.	cost each
1	8	C1,C2,C3,C4,C10, C20,C24,C25	.1uF Cap.	DG E1104	\$2.15
2	3	R1,R14,R15	4.7k 1/4W Res.	DG 4.7KQ	\$0.26
3	2	C5,C8	1000pF Cap. Mica	DG SE110	\$1.92
4	2	C6,C7	01uF Cap.	DG E2103	\$0.23
5	1	R2	43k 1/4W Res.	DG 43KQ	\$0.26
6	1	R3	6.8k 1/4W Res.	DG 6.8KQ	\$0.26
7	2	R4,R5	1.2k 1/4W Res.	DG 1.2KQ	\$0.26
8	1	L1	Delay Line	DG TK1001	\$0.26
9	1	R6	220 1/4W Res.	DG 220Q	\$0.26
10	3	C9,C18,C19	100pF Cap. Mica	DG SE103	\$0.62
11	1	C11	47pF Cap. Mica	DG SE103	\$0.62
12	1	R7	75 1/4W Res.	DG 75Q	\$0.26
13	1	L2	Transformer	DG TK1603	\$3.53
14	1	X1	3.58 MHz Crystal	DG X049	\$1.62
15	1	C26	10pF Cap. Mica	DG SE101	\$0.66
16	2	C13,C14	220pF Cap. Mica	DG SE106	\$0.89
17	3	C15,C16,C17	15uF Cap.Tantalum	DG P2039	\$0.74
18	3	R8,R9,R10	5k Pot.	DG QOG53	\$1.55
19	1	X2	Ceramic Resonator	MR CSB503J	\$3.00
20	1	U1	74LS163 Counter	DG DM74LS163AN	\$0.57
21	1	U2	74L02 Quad Nor	DG DM74LS02N	\$0.30
22	1	U3	74LS74 Flip Flop	DG DM74LS74AN	\$0.39
23	1	R16	1M 1/4W Res.	DG 1.OMQ	\$0.26
24	1	U5	CD22402 Sync Gen.	RCA CD22402E	\$12.00
25	1	U6	MC1377 Encoder	JAM MC1377P	\$2.29
26	1	C12	2-12 pF Var. Cap.	DG SG3006	\$1.23
Total Cost					\$57.06

Source Key

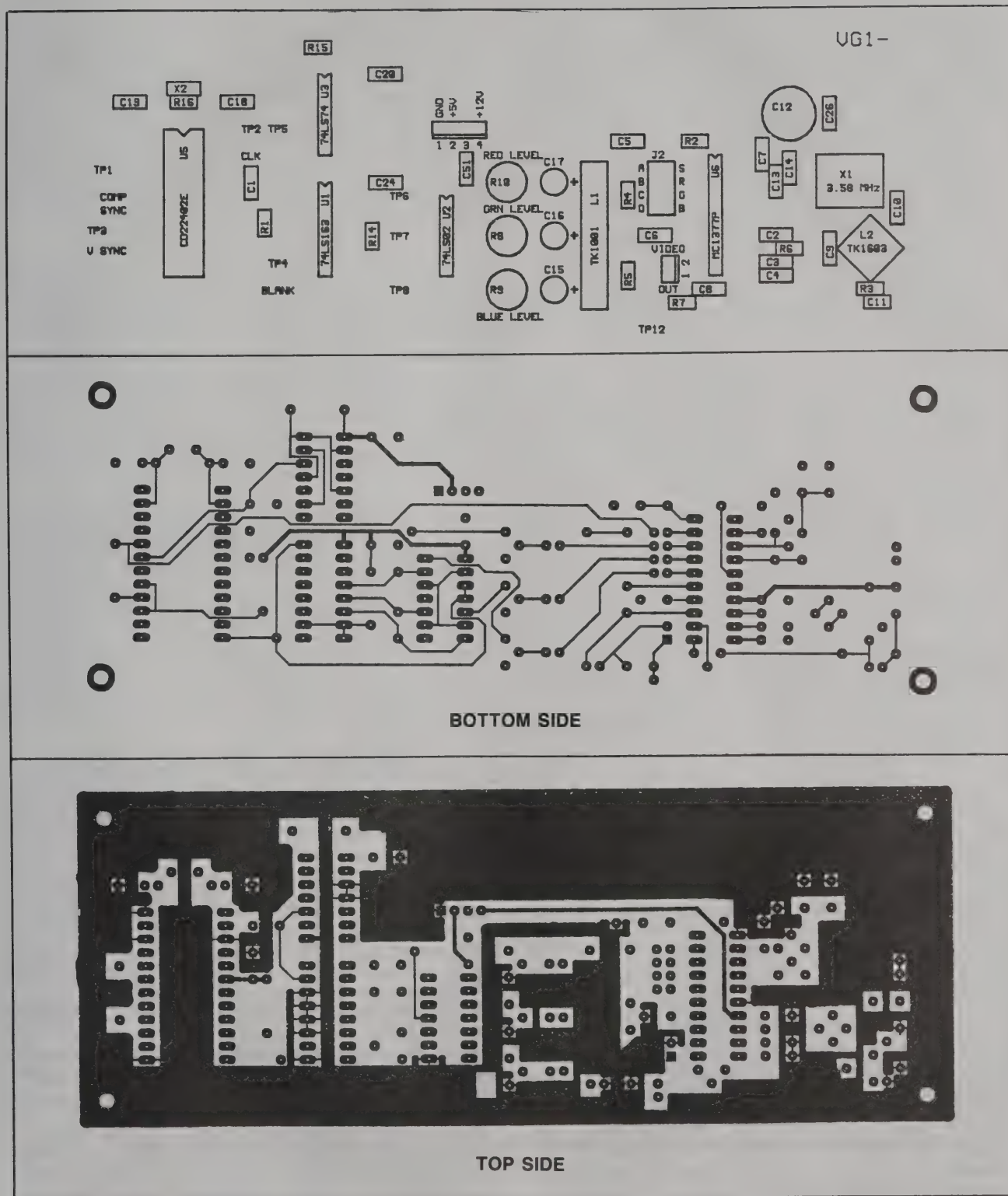
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A complete kit of all parts, step by step assembly instructions and circuit board is available from the author. Circuit Board Only \$30.00 Complete Kit \$80.00 Parts & Board Assembled & \$125.00 Tested Please add \$5.00 Shipping with any order. Washington residents please add appropriate sales tax. Thomas Gould WB6P, 13019 250th PL. SE. ISSAQUAH, WA 98027

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Color Encoder

The color encoder uses a Motorola MC1377 integrated circuit. This device takes the red, green and blue separate video signals and composite sync to generate the composite video signal. X1, the 3.58 MHz. color burst crystal, is the reference oscillator for the chroma information. C12 allows fine tuning of the reference oscillator to be exactly 3.579545 MHz. The combination of R2 and C5 set the timing for the insertion of the color burst signal on the back porch of the composite video signal. The values used set the burst timing to approximately 0.4 us after sync and a burst width of 0.6 us. The network of L2, C9, R6, C8, C11 and R3 provide bandpass filtering for the chroma component. R4, L1 and R5 provide a delay for the luminance channel (-Y) to compensate for the internal delay of the chroma signal.

Construction

I recommend a printed circuit board for this project. The frequencies involved require a good ground plane. I have built a prototype using a vector 8007 bread board which worked satisfactorily. Keep lead lengths short and use general good analog layout rules. I have included a printed circuit board layout and have available a double sided silk screened printed circuit board.

Testing

Resistance Checks Measure the resistance between the power buses before applying +5 and +12 volt supplies. Use your ohmmeter to perform the following checks: Connect the ohmmeter's negative lead to the ground foil and the positive lead to each of the following test points. J1 pin 2 +5V (reading > 2 Kohm). J1 pin 4 +12V (reading > 1 megohm). Power Requirements +12V @ 70 ma. +5V @ 100 ma.

Power on Tests

Connect the +12 and +5 volt power sources. Set R8, R9 and R10 to mid range. If you are the impatient type you can go right to the video output test point TP12 and see what you get. If you are lucky you will have a video signal that probably needs some adjustments. If that is the case you can proceed directly to the video adjustments section. If not you will have to progress slowly through the following steps to isolate the problem.

Trouble Shooting

Verify +5 volts on U1 pin 16, U2 pin 14, U3 pin 14 and U5 pin 19. Verify a 504 KHz. TTL level (approx 5v p-p) square wave on TP2 or U5 pin 6. Check for a TTL level composite sync signal on U5 pin 5 or TP1. Verify a TTL level blanking signal on U5 pin 13 or TP4. Verify a 252 KHz. signal at U3 pin 5 or TP5. Check to make sure there are divided down signals at u1 pins 13, 12 and 11 or TP's 6, 7 and 8.

Sync Generator

Verify +5 volts on U5 pin 19. Verify a 504 KHz. TTL level (approx 5v p-p) square wave on TP2 or U5 pin 6. Check for a TTL level composite sync signal on U5 pin 5 or TP1. Verify a TTL level blanking signal on U5 pin 13 or TP4.

RGB Generator

Verify +5 volts on U1 pin 16, U2 pin 14 and U3 pin 14. Verify a 252 KHz. signal at U3 pin 5 or TP5. Check to make sure there are divided down signals at U1 pins 13, 12 and 11 or TP's 6, 7 and 8 as shown in Figure 3.

Color Encoder

Verify +12 volts on U6 pin 14. Verify there is a TTL level composite sync signal like Figure 1(a) at U6 pin 2. Verify approximately 1V P-P signals at U6 pins 3, 4 and 5. Check for a 3.58 MHz. osc. signal on U6 pins 17 and 18. Make sure U6 pin 16 is 8.2 VDC. Check for a ramp signal at U6 pin 1. Verify a chroma signal like Figure 1(c) at U6 pins 10 and 13. Check for a luminance signal like Figure 1(b) at U6 pins 6 and 8. If all checks are ok you should have a signal like Figure 1 at U6 pin 9 except it will be approximately 2V P-P.

Video Level Adjustments Oscilloscope Available

If you have a oscilloscope available look at J2C or U6 pin 4 and adjust R8 for 1 Volt P-P. Adjust R10 for 1 Volt P-P at J2B or U6 pin 3 and adjust R9 for the same 1 volt level at J2D or U6 pin 5. Put the scope probe on the video output TP and terminate J3 pin 1 into 75 ohms and verify the composite signal is 1 volt P-P. If not adjust R8 for proper peak level and null out the chroma on the white bar (the first bar after horizontal sync) with R10 and R9.

Adjustment with monitor or TV set.

If you have a monitor hook up the video output of the video generator to the monitor video input and do all the adjustments looking at the left most white color bar. If the red, green and blue video levels are set up properly the white bar should be full brightness and white. If not adjust R8 for the overall brightness and then adjust R10 and R9 for a pure white bar. Summary Well you hopefully have learned something about color video and will be convinced to attempt this project. Fortunately everything is neatly broken into fairly simple blocks so you can be assured of success. Again if you have a IBM Clone computer with a CGA board you can use the encoder to generate composite video from your computer of any computer with NTSC format sync and RGB video outputs.

References 1. Ben Scott and Marty Bergan, Application. of the MC1377 Color Encoder, Motorola Application Note AN932. 2. Milt Wilcox, A Color TV Primer for the E.E., National Semiconductor Linear Applications Data Book

HERE'S ANOTHER HAM COMPUTER PROGRAM

This program for Commodore 64 was submitted by Dale, WA8KQQ. Change it to suit your TV station's call letters.

```
1 PRINT CHR$(147):POKE53280,7:POKE53281,
7:POKE646,0:PRING"(DOWN)(DOWN)(DOWN)
(DOWN)(DOWN)(DOWN)"
2 PRINT"(7 SPACES)COLOR TV ALIGNMENT
CHARTS":FOR DW=1TO1000:NEXT
3 PRINT"(12 SPACES)(DOWN) BY
WA8KQQ":FOR DW=1TO1000:NEXT
5 PRINT"(5 SPACES)(DOWN) TO CHANGE
PATTERN USE F1 (WAIT)":FOR
DW=1TO5000:NEXT
10 PRINT CHR$(147)::POKE53280,
0:POKE53281,0:FOR I=1TO24
20 PRINT "(RVS) (RED) W (BLU) A (YEL)
8 (GRN) K (WHT) Q Q (OFF)":NEXT
30 GOSUB 200
40 FOR I=1TO24:PRINT " (40 PERIODS)
":NEXT
50 GOSUB 200
60 FOR I=1TO24:PRINT " (40 SHIFTED PLUS)
":NEXT
70 GOSUB 200
80 GOTO 10
200 GET A$="" THEN 200
210 PRINT CHR$(147)::RETURN
220 REM CHANGE CALL LETTERS IN LINE
20 TO SUIT
from ATCO NEWSLETTER JANUARY 1990
-----
```

MICROWAVE OVEN FEED LINE DEVELOPMENT

Dave Pacholok, the designer of the microwave oven ATV transmitter, has stated that "long line effect" can cause frequency jumps. Dave recommends a maximum length of 17 feet. This problem was discussed with Dave, and he proposed mounting the magnetron at the antenna or the use of hardline. Since the WA8EOY transmitter is assembled in two separate enclosures, the prospect of mounting the magnetron unit at the antenna looked promising.

Wrong!

A meltdown occurred and it wasn't known to be happening because the magnetron couldn't be seen from the shack. There was no evidence of meltdown except for the loss of video. In this meltdown, eight inches of coax, two PL259's, the E-field probe, and the magnetron probe cap were all burnt to cinders. From this meltdown experience, it was determined that all units must be located in the shack. This was the sixth meltdown of several that happened during the design and development of the unit. Most meltdowns are caused by hot coax and fittings (bad SWR).

A long 40 foot length of coax with fitting was designed using Columbia C-1180 and the new Radio Shack teflon PL-259 (RS# 278-188). This coax ran cool but pulled the frequency up to 2450 MHz (band edge). The frequency was pulled down to 2410 MHz with a redesigned E-field probe. The new long cable and probe have been in operation for several months without any frequency jumps or meltdown. On-time was ten minutes or until the magnetron gets too hot to oscillate properly, and off-time was three to four minutes for cooling.

A detailed drawing of this new E-field probe may be obtained from John, WA8EOY. (Submitted by John, WA8EOY). TNX ATCO

WM8P ATV REPEATER

This is a progress report on the WM8P ATV repeater which will have an input on 439.25 MHz. and an output on 1280.25 MHz. The system will have a 147.45 MHz input for tone control functions.

In all probability, the system will serve mainly as a signal source for 1296 MHz band conditions. The repeater will not repeat unless the 70 cm window is opened by tone control. Also, a long ID may be triggered for testing purposes. Plans are to assign control codes as follows: TONE 1 for 440 MHz WINDOW; TONE 2 for LONG ID; and TONE 9 for RESET.

Bill, WB8URI, has offered to hang some antennas on the side of his 60 foot tower for the purpose of testing the system. It should be interesting to see how 18 watts delivered right at a simple antenna is received in Central Ohio. Once the system is debugged, a permanent site will be sought. The video generator is from Elktronics, and Bill, WB8ELK, created some excellent screen graphics

for repeater use. With help from Bill, WB8DMR, and Dick, W8RVH, a 1296 MHz oscillator has been phase-locked successfully. The VDG has been hooked up and modulates the PLL circuit nicely.

Most of the parts to complete the system have been purchased. Some sort of IF detector board is needed for the 440 MHz. signal. For this purpose, use of a MC1350 IF amp and a MC1330 video detector is being considered. Anybody having an old board at a reasonable cost that would do the job should contact WM8P. Available time to complete construction and necessary testing is limited, but it is expected that the repeater will be ready for installation by early March of 1990.

Here is a list of things yet to be accomplished: test 3 watt brick; mount and test 18 watt brick; construct tone decoder; construct timer and control board; construct 10 amp regulated power supply; mount all in waterproof cabinet.

(Submitted by Bob, WM8P, ATCO)



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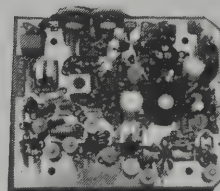
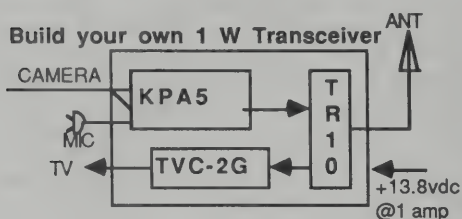
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KPA5-E 70CM ATV XMTR BOARD FEATURES:

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- FULL COLOR AND SOUND on a small 3.25x4" board
- Wired and tested board runs on external 13.8 Vdc @ 300 mA. supply or 12 V battery. Weighs only 3 oz.
- Accepts composite video from cameras, camcorders, VCRs, computers, etc. 2 audio inputs, one for low Z dynamic mic, & one line level from most cameras & VCRs. Transmit monitor output enables seeing your own true RF detected video.

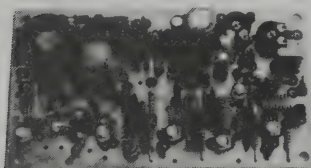
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Low cost per crash camera just right for R/C applications or second camera for call letter ID or DX. Size 4.7x3.9x2.2" and weighs less than 7 ounces. Requires 11 to 14 Vdc at 200 MA. Lens included. 19440 pixel, 120 line resolution with standard composite video output.

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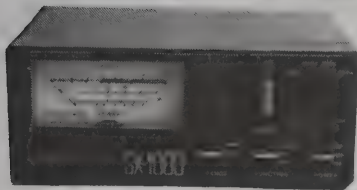
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Get maximum receive sensitivity by eliminating long coax loss. Automatic RF sense T/R switching from 1/4 to 100 Watts. Includes coax dc coupler & 12 V supply. .6 dB NF GaAsfet, 15 to 25 dB gain. Mounts on masts up to 2" dia. N female connectors.



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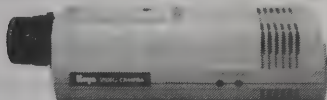
This power / VSWR covers just about all you will ever need in one box. No need for an expensive meter plus assortment of slugs for each band and power level. The SX-1000 covers 1.8 to 1300 MHz with switch selectable full scale ranges of 5, 20 and 200 Watts. SO239 connectors on the 1.8 to 160 MHz, and type N on the 430-1200 MHz sensor. Check your antenna VSWR as well as accurately set the blanking pedestal whether barefoot at 1 Watt or thru and amp at 100 Watts.



NEW APA ANT. MOUNTED PREAMP POWER SUPPLY...\$25

No need to dig into and modify your downconverter to RF decouple and power an antenna mounted preamp. This unit supplies +15 Vdc up to 100 MA to power remote preamps such as the Downeast Microwave 33 or 23 cm GaAsfet antenna mount versions, commonly used with our TVC-9G or TVC-12G downconverters receiving crossband repeaters. Comes with type N to preamp coax and BNC to downconverter connectors. These are receive only, not for transmitting through.

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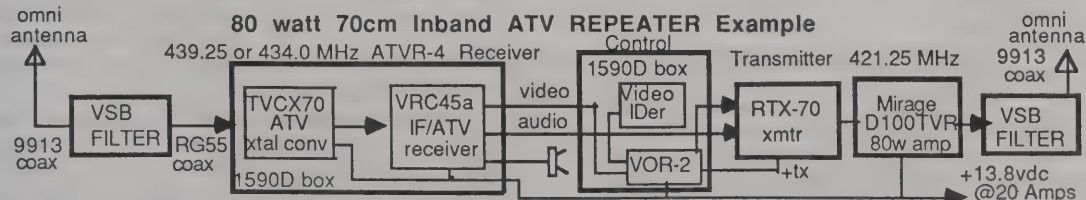
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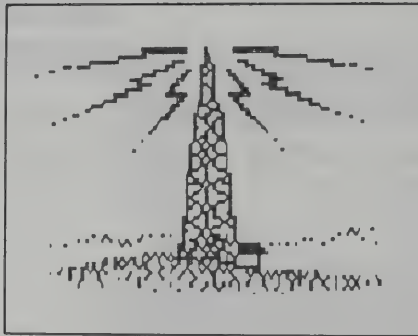


Select an ATVR Receiver (catalog pg 4) & a RTX Transmitter for the bands you want, add the appropriate linear amp, VSB filters & antennas, ID & VOR-2, power supply and coax for your own repeater. We suggest low in / high out for crossband. **VOR-2 Video Operated Relay board...\$45**, keys RTX upon detection of horizontal sync. 10 min. & end of transmission momentary relay for switching to video ID to meet FCC regs. Contact Bill Brown, WB8ELK at (419) 4228206 for the VDG-1 video IDer directly. 33 & 23 CM Amps - Downeast Microwave Bill (207)9483741, Omni gain Vertical Ant - NCG Co. Bruce (714) 6304541, VSB Filters - TX/RX Systems Jon (716) 5494700.

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900 MHz. ATV ANTENNAS

Bob Bruninga, WB4APR



Over the last year since we installed the 923 MHz. ATV repeater in Annapolis, I have built over a dozen receive antennas to help others get on the air. During field day this year, I took the time to measure a number of them out in the field to compare results. As I expected, the commercial antenna which I bought for over \$70 was the worst and the simplest, least critical, was the best.

My measurements were made standing on a picnic table on top of a reasonable hill with a very good horizon. We were about 10 miles from the repeater and the nearest trees were over 1/3 mile away and on slightly lower ground. I used a Hewlet-Packard step attenuator in the IF output of the converter and a voltmeter connected to the AGC voltage of the receiving TV set. The picture received was about P1 on the groundplane reference antenna. Each antenna was compared by adding attenuation to get the same AGC voltage reading. Antennas were moved around in the volume above the picnic table within arms reach to find the maximum signal in each case and to be sure they were not placed in a null or canceling field.

Before comparing relative gains, the reader must understand the implications of reflections on practical antennas. The signal output of an antenna system is the vector sum of all energy received by the antenna at a given point in space. The sum can either enhance performance by a few dB or cancel it completely. Everyone is familiar with the 30 dB or more variation in signal levels of a two meter mobile antenna as your car or HT moves only a few feet. As antenna gain is increased by adding more metal in the air, the effect of these deep fades is reduced because as one part of the antenna enters a fade, the other end is entering a peak. In fact, the true practical advantage of a gain antenna is that you get the average gain almost anywhere that the antenna is placed, as opposed to the gamble of being in a null with a simple dipole or ground plane which is susceptible to canceling fields from all directions.

With this in mind, the results are shown in the

figure. Since the ground plane antenna showed the highest fluctuations due to location, it was not used as a reference antenna. The 10 dB gain corner reflector antenna was assumed to be the reference and all measurements were made relative to it. Assuming my corner reflector antenna was not perfect, I assigned it a gain of 9 dB to serve as a reference point for my dB scale. The figure shows the performance of each antenna against the theoretical gain for that antenna type.

Since the ground plane antenna was purposefully placed in a peak signal location, its measurement showing a 3dB relative gain above the theoretical is consistent with the additive phase of the ground reflection. The coaxial colinear was not better than the groundplane, under these conditions, but its response was much less critical with respect to exact location (due to its larger size). It was good to see that the coaxial colinear did place its major lobe symmetrical with respect to the horizon.

It was obvious that the commercial ATV antenna with a claimed gain of 15 dB was cut to operate lower in the band. On 923 MHz the performance of just half of the antenna was on the order of 11 dB and was reduced to less than 8 dB when the full eight foot length was used. My homemade beam, scaled down from a popular ARRL 440 MHz beam performed surprisingly well. The best results as far as home-brewers are concerned was the reliable consistent results from the parabolic reflector.

The parabolic reflector antenna is simply a corner reflector but with the reflector bent into the shape of a simple parabola. I use a piece of cheap 1/2 inch hardware cloth about 1 foot by two foot mounted 3 inches behind a 6 inch dipole and bent into a curve as shown in figure 2. The dimensions are not critical at all and the size of the reflector can be doubled to pick up an additional 3 dB gain. The reason that I find this antenna to be so practical, is that the dipole can be made by simply stripping back a piece of coax 3 inches and bending the center conductor and shield into a dipole. This eliminates a connector and any metal contacts in the antenna. Since I routinely use surplus Cable TV cable for my projects, I find that a piece of 1/2 inch or 3/4 inch aluminum hardline will not only provide very low loss at 900 mhz for the feed, but will also support the whole antenna as well! Dimensions of the parabola need only be accurate to within a 1/2 inch or so. this parabolic reflector is acting more like an optimized corner reflector than an optical parabola. Or another way to say it, is that the theoretical performance of a corner reflector is based on it being a rough approximation to a parabola! So why not go ahead and pick up the extra few dB by bending the screen a little. To hold the shape, I use thin bamboo plant sticks available from any

ATVQ DEVOTED ENTIRELY TO HAM TV

900 MHz ATV ANTENNAS

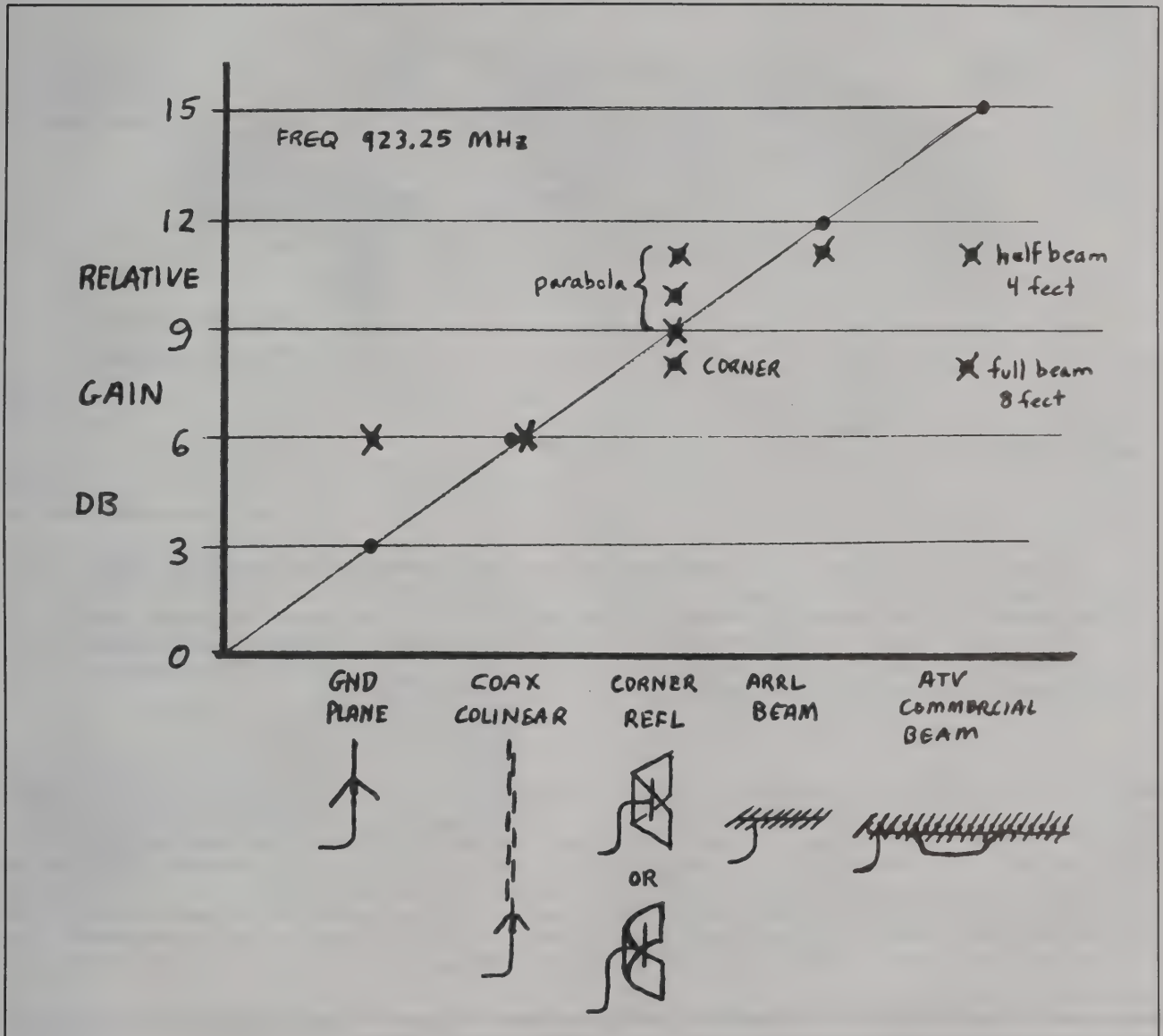


Figure 1. Straight line and dots represent theoritical or claimed performance. X'ed data points were measured as described in the text. The commercial beam was no better than every corner reflector type antenna measured and was much worse than manufacturer claims. The corner reflectors were simply slapped together with string and bailing wire and measurement accuracies on the order of 1/4 to 1/2 inch.

900 MHz. ATV ANTENNAS

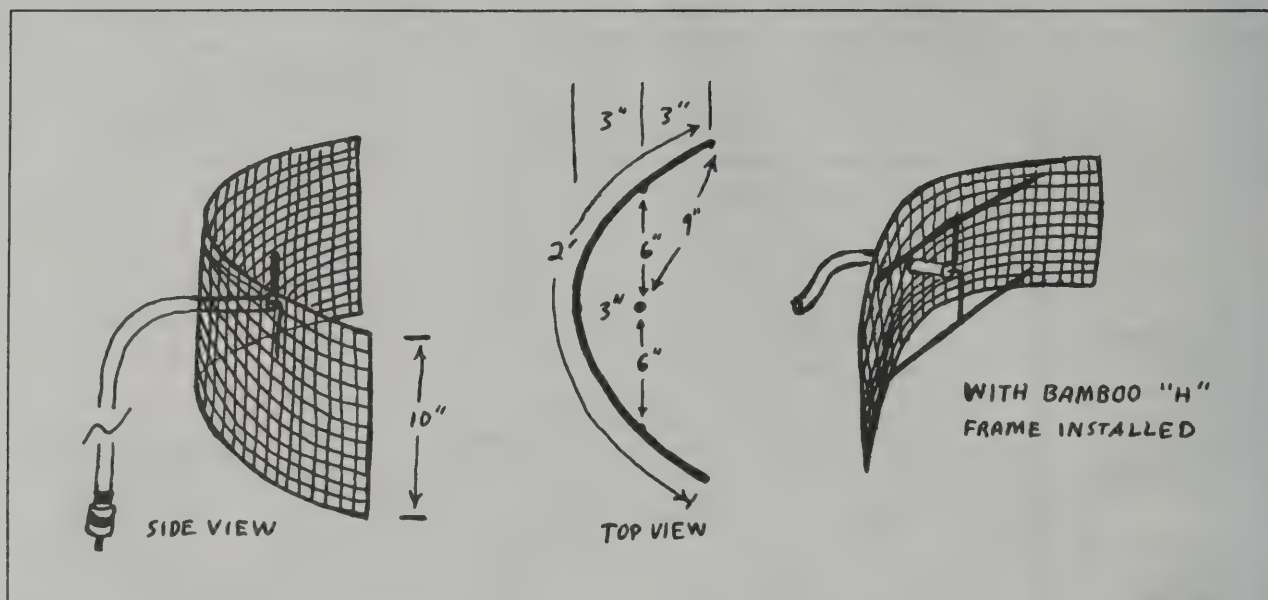


Figure 2. The 10 dB corner reflector is improved by bending into the shape of a parabola. Dimensions are not critical and the dipole can be made by bending the shield and center conductor of the coax. The coax elements are taped to a thin stiff insulating "H" frame which is wired to the reflector to help hold its shape. I used bamboo plant sticks.

plant store tied together in the shape of an "H". The dipole is taped to the center bamboo and weather sealed.

Since I typically use the surplus 75 ohm CATV cable, I simply solder the desired shack connector ("N", SO-239, or BNC) to a 3/4 or 1/2 inch copper plumbing fitting clamped onto the aluminum jacket of the cable. The purist may want to build a 1/4 wave transformer into the shack end of the coax to convert to 50 ohms by extending the copper fitting by 3 inches and using an appropriate diameter hobby brass tubing as a center conductor to make a section of 62 ohm line. This will convert the 75 ohms to 50. For 3/4 inch hardline, a center conductor of 7/32 hobby brass tubing will do fine.

FLEXIBLE 9913 COAX SOURCE

The solid center conductor used in RG-9913 transmission line is the main reason for its stiffness. Routing RG-9913 around the rotor at the top of the antenna tower will eventually cause fatigue of the center conductor. At the Findlay Hamfest, Dick, WB8VNC, found a supplier for flexible RG-9913. The center conductor is stranded and provides greater flexibility. This item is available from RF Products, 728 Meadowlane, P.O. Box 195, Greenfield, Indiana 46140. Phone. 317-462-6146.

Cable part number is 4XLIIA, and the cost is approximately 50 to 75 cents per foot. About 15 to 20 feet is all that is required to connect from your beam antenna, down the mast, and around the rotor. If your antenna is rotated to accommodate vertical polarization for receiving ATV repeaters, the flexibility of the RG-9913 solves that problem, too. (Submitted by Bill, W8DMR.) TNX ATCO

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ENGLEWOOD, CO 80110



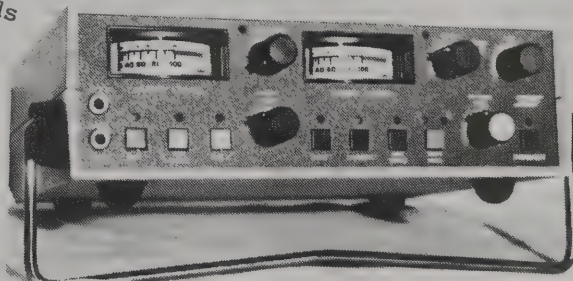
* Soft Touch Electronic Switching
* Upgrades to Other Bands

* Low Loss Cable NOT Required
* Built in Modulator

ATV

**AM
&
FM**

* Automatic Mic Level



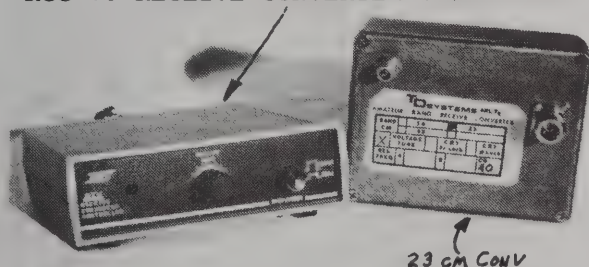
* Video White Clipping Provided
CU-125 CONTROLLER

For Smooth, Easy Operation, and Flexibility in Your ATV System, Build up Your Own Station By Selecting the Appropriate R.F. MODULES of Your Choice.

The CU-125 Control Unit Produces All The Control, and Processing Needed To Send And Receive ATV Pictures on Any of The Bands Covered By Our Transmit and Receive Modules.

If You Decide To Update Your Band Of Operation Or Try A Different Mode, Just Add The Required Transmitter, Converter, or Both At The Antenna And Your In Business Without losing the Old System. Just Switch Between The To.

RCC-10 RECEIVE CONVERTER CONTROLLER



23 CM CONV

Incorporated in the CU-125 Control Unit is two Independent Video Inputs, One 10 Pin, and One RCA Jack. Each With Its Own Video Level Control. Each Video Input after Selected, is Applied To A Video White Clipper Where Any Video Overdrive is Clipped Off, Reducing The Possibility Of Over Modulation An Automatic Pedestal Control Keeps The Proper Clipping Level At All Time. A Low Pass Filter IS Also Added To Remove Any High Frequency Noise On The Video Or Spurs Caused By The Clipping Action. One Item That Can Be Added At This Point Is A Small Sync Stretcher PC Board That Mounts On The CU . From This Point A Low Impedance Line Driver Amplifies And Drives The Processed Video Down The Coax To The Transmitter. A Video Output Monitor Jack Is Also Included To Monitor The Processed Video Before Or During Transmitting.

Both V.U. Meters And Led Clip Indicators And Monitor Outputs Jacks Is In Full Operation Before And During Transmission.

External Mic Audio Is Applied To An Automatic Gain Control Amp With An Input Level Control Added To Vary The Amount Of Audio Before Compression Starts. Aux Audio Is Applied To A Rear Pannel RCA Connector With Its Own Level Control. A RCA Output Jack Is Also provided To Enable Monitoring The Audio As Its Applied To The Audio Sub Carrier Gen.

A Crystal Controlled Sub Carrier Generator Is Also Provided Programed To 4.5 Mhz. Other Frequencies Can Be Programed By Changing PC Straps. Sub Carrier Injection Level Is Also Adjustable.

Power Requirements For The CU-125 And All Modules Is 12-14.5v D.C. Input. Complete Regulation And Filtering Makes This Unit Ideal For Base Or Mobile Operation Little Affected By Voltage Fluctuation.

CU 125 CONTROL UNIT
Box Size 2.52 x 8.10 x 6.12"

\$229.00

AM TRANSMITTERS

70 CM -- T70A	\$132.00
33 CM -- T33A	\$137.00
23 CM -- T23A	\$137.00

To add 2nd Frequency	\$10.00
If on carrier audio modulation is required	\$10.00

FM TRANSMITTERS

33 CM -- T33FM	\$138.00
23 CM -- T23FM	\$138.00
FM DEMOD BOARD	\$169.00

(Installs in CU 125, Required to receive FM ATV)

REC CONVERTERS

70 CM -- RVT-70	\$89.00
33 CM -- RVT-33	\$103.00
23 CM -- RVT-23	\$109.00

FOR CRYSTAL CONTROL OPTION	\$30.00
To add 2nd Frequency	\$10.00

SHIPPING & HANDLING
Texas Residents add 7% sales tax

NEW!

RCC-10 RECEIVE **14.50**
CONVERTER CONTROLLER

FM DEMOD BOARD

* SPECIALLY DEVELOPED NARROW BAND FM DEMOD

MODULE WITH AN AGC IF, SHARP SLOPED SAW

FILTER, AND A NEWLY DEVELOPED LOW THRESHOLD

PHASE LOCK LOOP VIDEO DETECTOR

T.D. SYSTEMS
2420 SUPERIOR DR. 'B'
PANTEGO, TX 76013
817-861-5864

THE OLDE ANTENNA LAB EFFORT

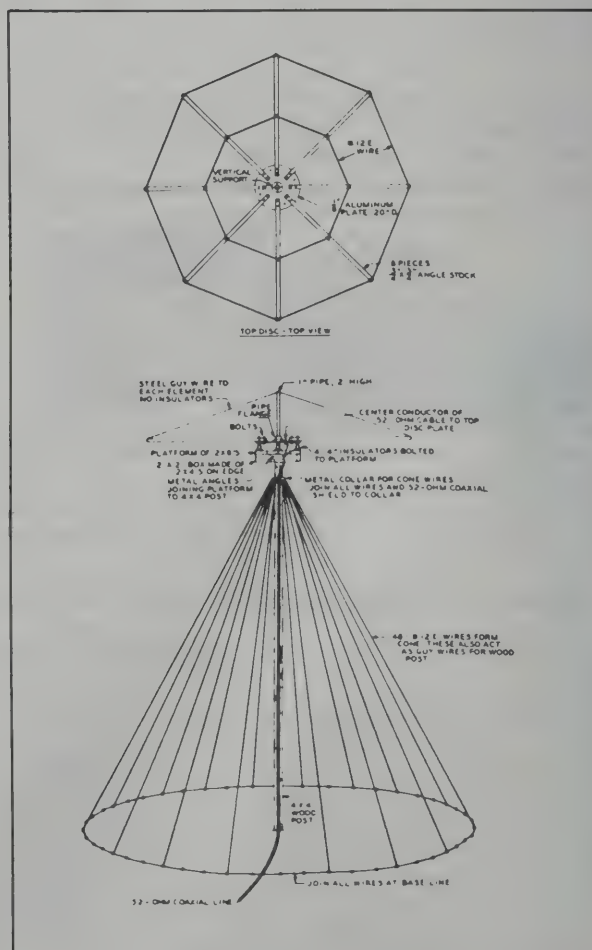
The Chief Engineer, Dave Clingerman, of the Old Antenna Lab has been a licensed amateur for about 40 years. He received his first ticket in 1950 as W8USL, at the age of twelve. Five years later he enlisted in the U.S. Navy where he studied Airborne, Shipborne and Shorebased Electronics. Specializing mostly in Special Projects type work, he became very expert in practical electronics engineering and application. During his 22 year Naval Career he attended more than 50 formal schools, completed some 100 correspondence course, amassed approximately 17,000 flight hours. Dave flew as an aircrewman in positions of Electronic Countermeasures, Radio Telemetry, Radar, Special Sensors (Infrared, Low Light Level Television and Laser Intensifier) Operator. In his spare time he attended thirteen different colleges and universities. After retiring, in 1976 as a very senior Aviation Electronic Technician a serious full-time college endeavor was undertaken that resulted in a Bachelor of Science Degree in Electronic Engineering in 1981 followed by a Masters in Organizational Management.

Dave, now at Martin-Marietta Astronautics Group in Denver, CO where he is employed as Radio Frequency Manager and Resident Senior R.F. Engineer has held such positions as TITAN Space Launch Vehicle R.F. Engineering Lead and Senior R.F. Communications Engineer on the famous Autonomous Land Vehicle Project. As a charter member of the Western Vision Network, the Denver Amateur TV Group, he quickly recognized a need for low cost UHF and Microwave antennas, along with various associated R.F. hardware to assist in facilitating both fixed station and mobile ATV operation.

The following pages are the offering of the OLDE ANTENNA LAB OF DENVER, COLORADO.

THE DISCONE

Sometimes I enjoy amazing and amusing myself with my ability to workout seemingly impossible mechanical detail. This was the case with the Discone. I've often thought I had a need for an antenna that would cover 140 - 1400 MHz, accept predominately vertically polarized signals, be light weight and portable (mobile). I've read many construction articles on the Discone plus used them quite extensively in the Navy. However, the hub where all the radial are attached seemed like a machinists nightmare. Being a proponent of brass and copper I decided to see what I could do to improve on the hub construction and in general create a simpler to construct antenna. The results were a very sturdy structure. I started with a 1/2" I.D. copper pipe two (2) feet long. On one end I affixed a "N" male connector. Placed inside the copper pipe, the center conductor was fitted with two teflon washers to help maintain spacing. I decided to use sixteen (16) radials, 20 inches long each, for the ground plane and the same number, 7 inches long each, in the disc. Two (2) washers with a liberal amount of solder produced a sturdy disc. The hub was built of a copper pipe, size reducer that I worked with a bandsaw and vertical sander to get to the size and shape desired. This hub was then fitted with a teflon shoulder washer. The air transmission line center conductor slipped through the shoulder washer center hole. The hub fit over the teflon shoulder washer. The sixteen (16) radials are then place around the circumference of the transmission line, equally spaced and slipped under the lip of the hub. The transmission line is then pushed firmly against the shoulder washer and with a torch solder is applied beneath the lip of the hub, soldering the radials in place between hub and transmission line. Allow it to cool before moving otherwise a colder solder formation could occur. I like to clean the rosin from my work with alcohol and a wire brush.

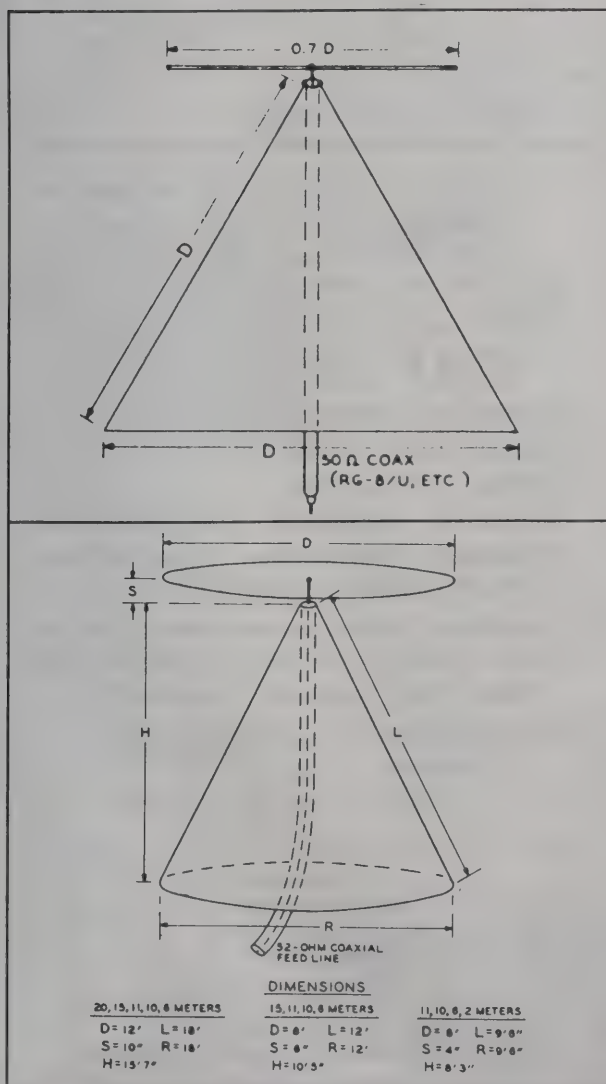


THE OLDE ANTENNA LAB EFFORT

Solder the disc to the transmission center conductor and you have a Discone.

I ran my tests, S11 and Mag Log, on a scalar network analyzer. The results were a fairly flat response from 140 MHz out to 1400 MHz which was less than 2:1 VSWR with the exception of one segment of 800 - 900 MHz where the VSWR was 3:1. Since this antenna was going to be used for reception I really didn't care if the VSWR went to 7:1 (this is about where degradation starts to be noticed on receive). The VSWR being as low as it is where it is there is no reason it couldn't be used as a transmit antenna for 2 meter, 1 1/4 meters, 70 cm, 33 cm, and the 23 cm bands. These can be built out of sheet metal but will have considerable wind loading over the skeleton discone. The gain is about that of a dipole. Prepare to spend considerable time building one or buy of mine.

Built and tested \$189.95



HELIX, 10 ELEMENT RHC "L" BAND

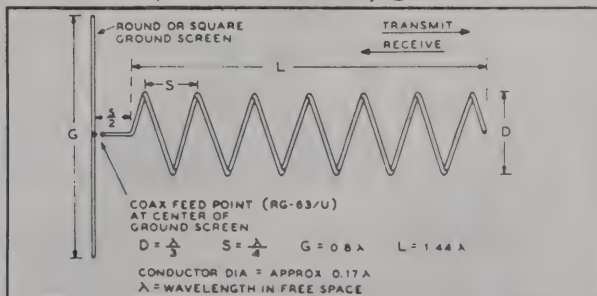
The Helix, pioneered and proven by Dr. John D. Kraus - W8JK has the most gain per element of any end-fire arrangement of parasitic elements. The Helix is known as a traveling wave type of structure that exhibits very broadband characteristics. Bandwidths on the order of 10:1 are not uncommon. As we use higher and higher frequencies the wavelengths diminish to a point that millimeter waves reflect from a human body and can be used for imaging. The fact being presented here is that microwaves and millimeter waves bounce off things. Some of these things we don't care about along the line of incidental propagation toward the intended target. Then, when the energy reaches a receiver we have incident waves and out of phase waves reaching the target by way of different paths. This condition is known as "multipathing".

If a circularly polarized antenna propagates energy in a Right Hand Circular (RHC) manner, upon striking an object on the way to the target it reflects off the object, but with the opposite polarity (LHC). A receiving antenna at the target that is RHC will not see the Left Hand Circular (LHC) energy. This then is the solution to the multipathing problem, a way of getting rid of flutter and ghosting, (non-intelligibility in voice communications, multiple image in video). If energy is vertically or horizontally polarized from say a video repeater and you use a Helix of 10 turns, 15 dBd gain, you take a 3 dB polarization penalty, but you still have 12 dBd gain and no multipath degradation. Really, it's worth it. The Helix as you are probably aware has a terminal impedance of 140 ohms. If not, this is fact. There are several ways of achieving a 50 ohm match. I prefer the "Z-cone", a quarterwave section of transmission line that is 140 ohms at one end and 50 ohms at the other. This is built into the back side of the Helix reflector, terminates in a type "N" connector and satisfies our requirements of a 50 ohm feed.

These antennas are fairly light weight, durable and not too unsightly. Even a four Helix array doesn't get to large (2' X 2') reflector, produces > 20 dBd gain with a 20 degree beamwidth at "L-Band".

Single Helix, built and tested, \$54.95

Quad Helix, built and tested, @224.95



THE OLDE ANTENNA LAB EFFORT

FEEDS FOR THE PARABOLIC DISH

Now that most of us have become disenchanted with TVRO, your LNA has given up the battle of weather and birds, and your converter/control is defunct, what is that "eye sore" in the back yard good for, (asks the hausfrau)? Well of course, a parabolic dish of any size in and of itself is a thing of beauty and a joy forever. How about, before the YL/XYL plants flowers in it, you reclaim it for ATV. All you need is a "feed". The OLDE ANTENNA LAB to the rescue! First a couple of realizations - a 10' dish at 430 MHz will allow about 20 dbi gain, providing your harmonics haven't been using it for a baseball target, so anything smaller you may as well stick to yagis. However, at 23 cm (1250 - 1300 MHz) a 10' dish exhibits about 30 dbi gain. An f/D ratio of 0.5 is desirable because feeding such a dish with a dipole/reflector disk combination will afford 30 db drop offs just outside the lip of the dish satisfying a feed main lobe of 106 degrees. You'll need to find the focal point of your dish, so use the following equation:

$$f = D^2/16c$$

f = focal point measured from the rear plane of the dish.

D = the diameter of the dish.

(calculate in like units)

c = the distance between dish rear plane and lip plane.

The point "f" should fall at the phase center of the feed, half way between dipole and reflector.

The hardline portion is 3/4 wavelength, 60 ohm section with a 1/4 wavelength choke cut in one end and an "N" female connector on the other.

Reason for 60 ohms:

$$Z_0 = \sqrt{Z_1 \times Z_2}$$

$$60 = \sqrt{50 \times 72}$$

The dipole is 72 ohms and the input connector is 50 ohms. The dipole is fairly standard being 1/4" dia. and overall about 4.4" long. The reflector disk is about 4.6" dia., tin, brass or copper, (depends what I had on hand the day it got built). The reflector is movable and securable using a hose clamp/collar arrangement. The feeds are tested and shipped with the reflector just at the bottom of the choke slit. These are fairly easy to build if you have the tools available which are fairly expensive. So, let me do the work and you can put your TVRO dish back in service for something other than turning yourself into a "couch potato". The reflector has little ears, in three places, provided for mounting struts. Wood or fiberglass may be used for this purpose.

Built and tested:

Model OAL DF-23 (23 cm feed) \$49.95

Model OAL DF-70 (70 cm feed) \$69.95

Postage and handling (per item) \$3.00



WHEELS

(Little, Mini, Micro)

"AS USED AT THE EDGE of SPACE"

- Omni-Directional ANTENNA
- HORIZONTAL Polarization
- Very Lightweight
- Used on Balloons, Kites, R/C
- Available for 70cm, 23cm & 13cm
(33cm Special Order)

P4 signals have been sent 393 mi.
Using 3 watts into a little-WHEEL
From the Edge of Space.*

Assembled/ — \$24.95
Tested

KIT — \$19.95

Add \$3 for Postage - SPECIFY BAND
& CONNECTOR

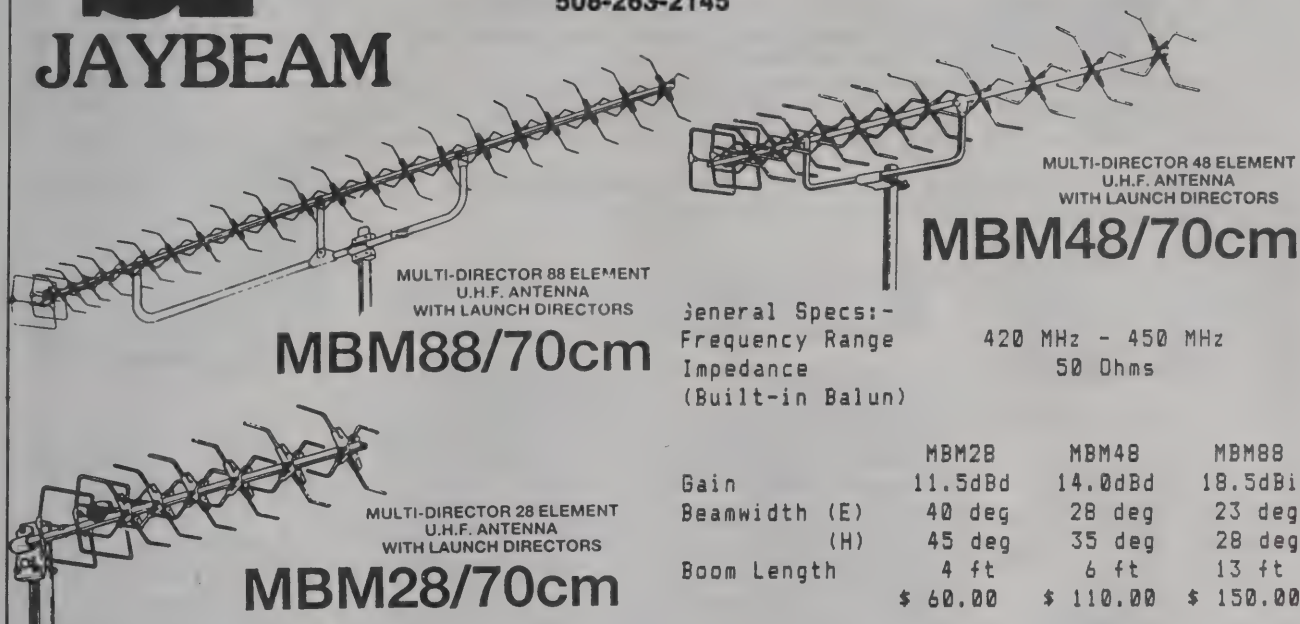
Dave Clingerman W6OAL
Olde Antenna Lab
4725 W. Quincy # 1014
DENVER, CO 80236

* - <KDØFW Balloon Flight - FEB. 10, 1990>

si JAYBEAM

SPECTRUM INTERNATIONAL, INC.

Post Office Box 1084 T
Concord, Massachusetts-01742
508-263-2145



MULTI-DIRECTOR 88 ELEMENT
U.H.F. ANTENNA
WITH LAUNCH DIRECTORS

MBM88/70cm

MULTI-DIRECTOR 28 ELEMENT
U.H.F. ANTENNA
WITH LAUNCH DIRECTORS

MBM28/70cm

MULTI-DIRECTOR 48 ELEMENT
U.H.F. ANTENNA
WITH LAUNCH DIRECTORS

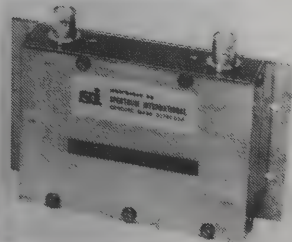
MBM48/70cm

General Specs:-
Frequency Range
Impedance
(Built-in Balun)

420 MHz - 450 MHz
50 Ohms

	MBM28	MBM48	MBM88
Gain	11.5dBd	14.0dBd	18.5dBd
Beamwidth (E)	40 deg	28 deg	23 deg
(H)	45 deg	35 deg	28 deg
Boom Length	4 ft	6 ft	13 ft
	\$ 60.00	\$ 110.00	\$ 150.00

VHF/UHF BANDPASS FILTERS



KNOCK OUT INTERFERING
QRM OR SELF-DESENSE!

BNC Standard
TNC or Type 'N' optional
(slightly higher prices)

The PSf... series of Band Filters are for receiver pre-selector and transmitter use. The filters are 3 pole, 7% bandwidth, 0.1 dB ripple designs with 30 dB shape factor of 4:1.

The PSf...ATV series of TV Channel Filters are 5 pole, 6 MHz bandwidth designs. They are used to protect your TV receiver from inband QRM and to "strip-off" the unwanted sideband of your transmitted vestigial sideband signal.

Model	PSf144	PSf220	PSf432	PSf900	PSf1296	PSf1691
Freq (MHz)	140-150	216-228	420-450	890-940	1250-1340	1650-1750
Loss (typ)	0.1 dB	0.1 dB	0.15 dB	0.2 dB	0.25 dB	0.25 dB
	\$ 99.00	\$ 99.00	\$ 99.00	\$ 99.00	\$ 99.00	\$ 99.00

Model	PSf421-ATV	PSf426-ATV	PSf439-ATV	PSf910-ATV	PSf1253-ATV
Loss (typ)	2.0 dB	2.0 dB	2.0 dB	2.5 dB	3.0 dB
Std conns.	BNC	BNC	BNC	N	N
	\$150.00	\$150.00	\$150.00	\$175.00	\$175.00

All prices FOB Concord, Mass.

PRICES SUBJECT TO CHANGE WITHOUT PRIOR NOTICE

SPECTRUM INTERNATIONAL, INC.

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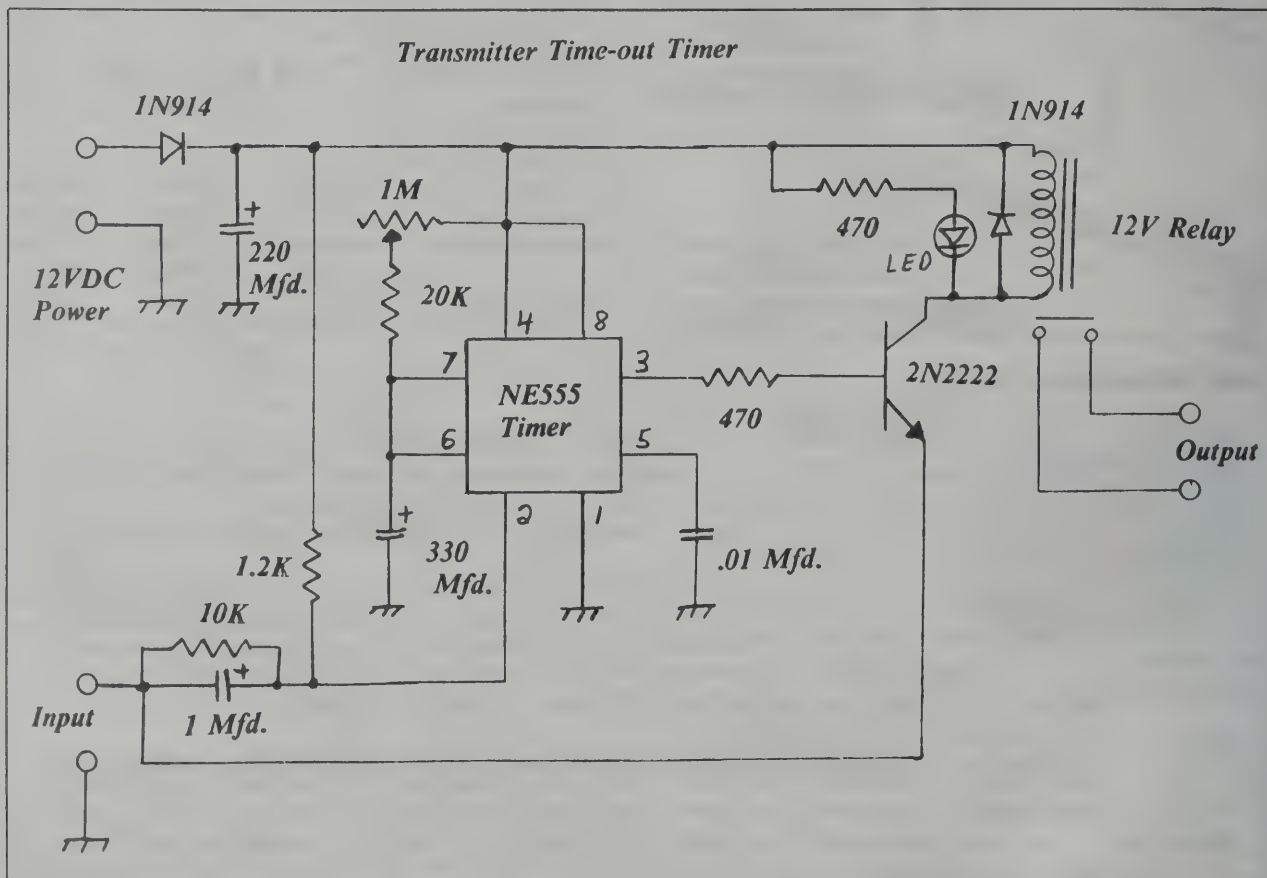
SIMPLE REPEATER TIME OUT TIMER

Bob Spahn WD5BJW

I just finished a touch tone remote control of my Base ATV station and needed a transmitter time out timer. I came up with this simple circuit and thought your readers might be able to use something like this on their repeaters or other transmitters.

To key my transmitter I use a dry contact closure, so this is designed to be put in that keying line. A LED indicates when it is keyed, and if power is lost it will not return to the ON state when power is restored. The circuit fits into a Radio Shack plastic box, and I built mine on perf board in a matter of minutes.

The T.T. remote control is a novel circuit, it has eight outputs and a three digit access code. The codes are stored in E-prom and there are no microprocessors on it.



Parts List

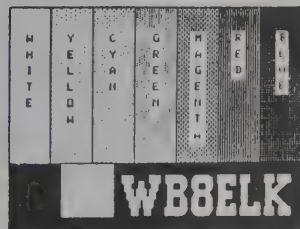
- | | |
|----------------------|----------------------|
| 1- 2N2222 transistor | 1- 1 mfd cap. ele. |
| 1- NE555 Timer | 1- 330 mfd cap. ele. |
| 1- 1N914 diode | 1- 220 mfd cap. ele. |
| 2- 470 ohm resistor | 1- .01 mfd cap |
| 1- 1.2K | 1- LED & clip |
| 1- 10K | 1- terminal strip |
| 1- 20K | 1- 12V. relay |
| 1- 1 meg pot | 1- box & perf board |

- Notes: 1) LED indicates xmit on
2) Contact closure for input and output
3) 1 Meg pot adjusts timeout
4) Will not retrigger if power is lost



ELKTRONICS

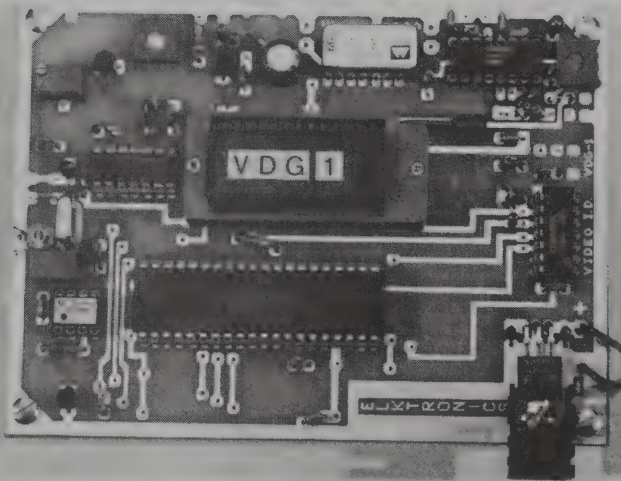
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Findlay, OH 45840
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VDG-1

VIDEO I.D.



- Instant Video Source
- 4 Graphics Screens
(2 Hi-RES / 2 Colorbar)
- 12 V D.C. Operation
- Video Relay for switching in
live camera video
- Built-in Sequencer/Timer
(Steps through all 4 screens)

VDG-1 with Pre-Programmed
Custom Callsign Logo

- \$99 ppd.

(Quick-release socket option)

- \$10

**Call or Write for CATALOG
of available Graphics**

Additional Programmed EPROMS

- \$19

Now available as a Kit

- \$89 ppd. Blank PCB - \$19



KA0JAW

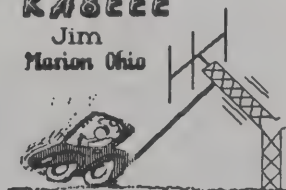


N9CAI / r



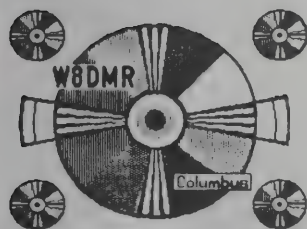
K8EEE

Jim
Marion Ohio

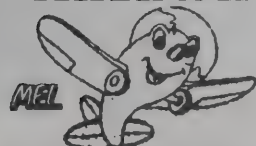


KA8ZNY

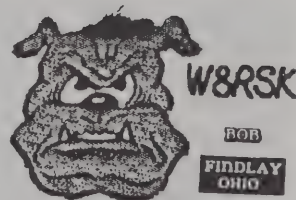
GROVEPORT



KA8LWR



IN BUCYRUS, OHIO



ATVQ TRAVELS

SEATTLE



Henry KB9FO with Mike Lamb, president of AEA at AEA HQ

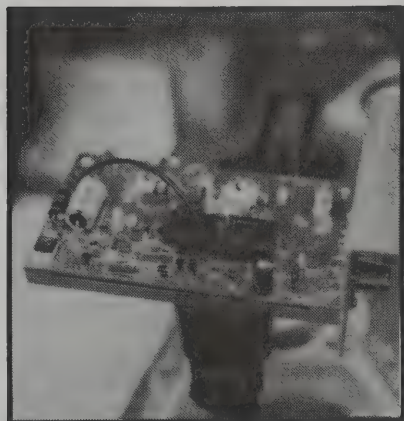
ATVQ gets around!

ATVQ's publisher, Henry KB9FO spent a weekend in Seattle visiting with the WWATS group and a general tour of the area. Our thanks to Chuck Northcutt and his group for the hospitality!

While in the area we were able to visit several places of ham radio note. Included were AEA, ICOM, Amateur Electronic Supply of Seattle. Our visit to AEA was the better part of the day, discussing the AEA ATV equipment and ham radio in general. Pictured below is ~~one~~ of the new mast mounted POWER AMPS in final test. The unit will be available soon from AEA dealers. Considerable effort went into the design to provide a compact mast mounted, remote powered power amp and preamp in a single unit. The emphasis was on providing true class A operation to keep intermod products low to preserve the VSB characteristics of the AEA FSTV 430A ATV transceiver. The unit will provide 50 watts output to your antenna (which should be only a few feet away) which is probably more than your 100 watt shack amp provides. It can be driven by any ATV transceiver since it has a gain controlled input to limit drive. Input power should be .1 to 1 watt. The amp will provide full 50 watts out over about a 10 db input power range.

The preamp is a low 3rd order intermod design to reduce the problem of strong signal overload. Its additional tuned circuits may also help your shack receiver in high RF environments.

The cost of the system includes a dual power supply which will provide 12 volts for your shack ATV equipment, 28 volts to power the mast mounted power amp and preamp and switching. The unit is about \$200 less than buying separate power supply, preamp, power amp and coax relays.



New AEA mast mounted power amp in final test.

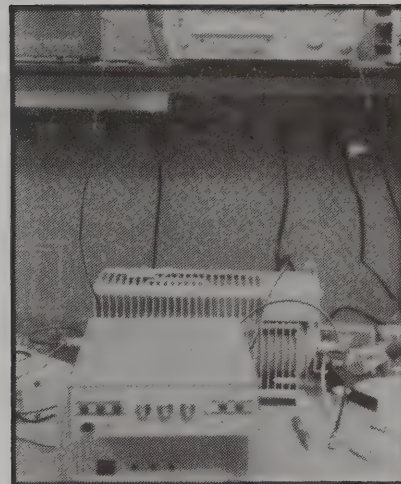


Henry, Mike Lamb of AEA and third guest at Dayton booth 1990.

ATVQ TRAVELS



Al Chandler chief engineer of AEA talks at ATVQ ATV Party, Dayton 1990



Prototype AEA 900 Mhz. ATV transceiver.



Main display counter at AES Seattle.

AES of Seattle is one of those great ham stores with a little of everything. Including copies of ATVQ! The help are friendly and are happy to answer your questions about equipment. There are lots of used equipment trade-ins on hand as well as boxes of goodies (parts, plunder, junk as your YL would describe it).

INPUT NEEDED

Send in those technical articles now! We publish everything of substance that arrives. Readers love those construction projects, write-ups about your repeater or club activities, technical topics and humor. In this issue are good theory and technical discussion on video tape and the VHS format. Also some thoughts on how to use that discarded TVRO antenna and a series from Mr. Wizard, W7YZZ Louis Hutton who is one of the original SSTV stations experimenting in that mode. Louis has also a great many QST articles to his credit.

DON'T FORGET WE NEED SPEAKERS FOR THE DAYTON FRIDAY NIGHT PARTY. IF INTERESTED DROP US A LINE NOW!

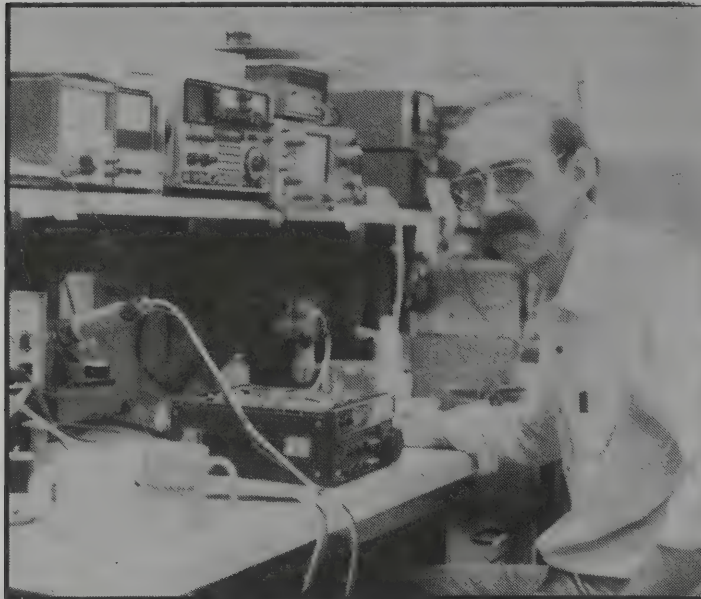
YOUR SUBSCRIPTION LABEL

If there is a red line on your address label your subscription is expired. If there is a yellow line on your address label, this is your last issue. If there is no colored line your are not expired. Subscription code: V3=1990, V4=1991, V5=1992 etc. #1=January, #2=April, #3=July, #4=October.

SEATTLE

Our visit to ICOM allowed us to see the repair area and ham shack. ICOM makes equipment for nearly all radio services including marine, aircraft, public safety. The repair department answers about 300 calls a day. According to the head engineer, most units sent in for repair are in PERFECT working order. Its usually an operator or antenna problem! Read the manuals if all else fails!

PHOTOS: below left; Tom Moore KF7GH, service manager of Icom final tests a repaired unit. Below right; Joy KB7KCU, WWATS member checking out the equipment in the Icom Ham Shack.



CHAMPAIGN ILLINOIS BALLOON

On December 1st (Dec. 2nd alternate), a five foot weather balloon will take a 1 watt ten meter CW transmitter up to 95,000 feet. Liftoff of DRIFTER 1 is scheduled for 1530 UTC from the QTH of Tim O'Connor KA9SZY in White Heath, Illinois (near Champaign- Urbana). An HF net will be operated by WE9E on 7.155 MHz starting at 1430 UTC for launch information and reception reports.

The payload will continuously transmit a 45 second CW message on 28.866 MHz using the callsign N9JL. The spacing between each CW message indicates the outside temperature. Anyone within 400 miles of the launchsite should be able to copy the telemetry. If conditions on 10 meters are good, the balloon signal should be received by a large part of the world. A special QSL will be issued for reception reports. QSL via John Lutz KA9WWA, 2032 Adams, Rolling Meadows, IL 60008. Additional information can be obtained via packet from Mark Garrett KA9SZX @W9YH.IL.USA.NA. Thanks to John Lutz for this information.



HAM RADIO ON SATELLITE TV

BOSTON

MBC, HAM RADIO NEWS will be a weekly 1/2 hour news report on the happenings in Ham Radio. We will be broadcasting on **WESTAR 4 transponder 13 at 8:00 AM EST. SATURDAYS.**

The show will have news, reviews and how-to's with your funniest ATV video mixed in to the show. We need ATV'ers to send in any video footage they think would be useful or enjoyed by the other hams.

ANy ideas or suggestions from hams will be appreciated and credit given for such but we will not be dependent on any input for the show, it will go on no matter how much or little info we receive from hams. Our writers will keep us busy! We will try our best to make the show informative and enjoyable for all.

We also hope to get President Bush to do the intro to our first show via videotape, we are waiting for a reply.

Anyway, thanks Henry for the encouragement on our project, and the videos. We won't let ham radio down! Jack Moran N6FUG

SEND VIDEO TO: MBC-TV
c/o Jack Moran
449 Nickman St.
Chula Vista, CA 92011

The Boxborough hamfest was GREAT!!!

The weather was left over hurricane with periods of rain and sun. This kept the crowds surging in and out of the exhibition hall which was great for the Q as we were in the commercial vendor area! The whole fest is contained within the Sheraton hotel which was booked out for the weekend. Only the flea market was outside, but right next door to the commercial area in a reserved part of the parking lot. This is a lot nicer than most big fests where you have to drive miles, park miles and walk miles! We look forward to returning to the next Boxborough hamfest in 2 years.



The ATV forum was packed. Speaking were Henry KB9FO on how ATV can help promote ham radio (Helping Ham Radio to be Seen) and by Bill WB8ELK, who spoke of his latest ATV Balloon adventures. Carol Perry WB2MGP spoke on how she used ham radio in her classes and in particular how she was using ATV and was looking for help with materials about ATV and ham radio.

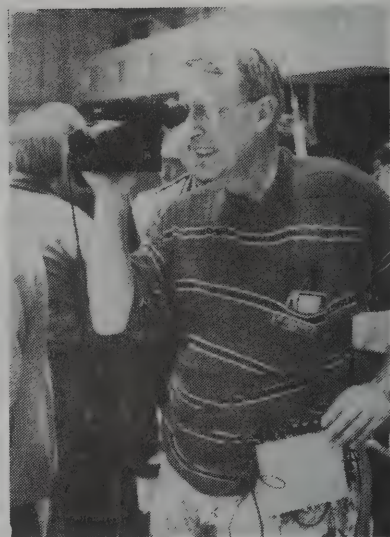
ECAT East Coast Amateur Television had a live demo display the whole weekend on the main hallway leading to the exhibit area and across from the forum rooms. At least three ATVers were

provide live walk-around coverage using home made "porta-lookie" ATV stations. Pictured is a "shoot-off" between Jay W1ELX and Lyn W1NRE! The entire ATV forum was televised by Jerry N1FFD.

BOSTON



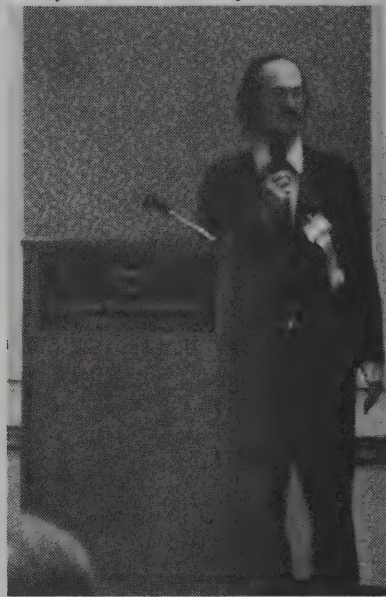
Video shootout



Lyn WINRE and his porta-lookie.



Live TV coverage of ATV forum.



WB8ELK, Bill addresses ATV group.



If you haven't read it . . . Radio Scan is a general interest ham radio magazine with both an English and a Spanish edition. Each issue has features on all aspects of ham radio including ATV, packet, FAX, RTTY, DX, beginners and general news. They recently moved to bigger offices and are now doing their own printing to have better control of their product quality. Its a high quality glossy magazine. Check it out. Their ad is elsewhere in the Q.

HAWAII

We managed a 10 day visit in Paradise, spending three days in Oahu and Honolulu, a day on Hawaii watching lava flow into the ocean, walking on a day old beach made from lava "sand" and the remainder on Kauai; doing the islands!

ATV is coming alive in the 49th state. Several stations we worked on 2 meters from our beach front hotel in Honolulu reported they had purchased ATV equipment. Katashi Nose KH6JI checked in, a long time ATV'er. There is an effort to put up an ATV repeater in the Honolulu area which will get things moving. We took lots of equipment with us which was a little difficult as the YL had to carry the bags! As you can see from the photo, I was a little handicapped! You might notice my left leg was a lot bigger than my right! For those who called in, you know, for those who haven't, I had extensive reconstructive knee surgery on August 7th. on my left knee. This leaves me with nearly zero cartilage in my left knee and with bone to bone contact. I'm off crutches now but my Flamenco dancing and tower climbing days are over.

But walking sticks in hand we had a good time in Hawaii. We visited the local ham store, Honolulu Electronics, conveniently 2 blocks away from the largest shopping center (for the YL). There was also a ham picnic at a private ocean beach park on Saturday. There were "door" prizes, luau style food for all and warm sunshine for "catching the rays" or swimming. It was a real family outing with about 300 hams and their families. We spoke with many on hand and eager folks grabbed copies of the Q.

Food and accommodations were fantastic. About 100 feet to the ocean, pool or food! You can't get lost, all but the Big Island of Hawaii are the size of or smaller than Metropolitan Chicago, and there are few roads. On Kauai there is basically only 1 road, which circles the island. A few short roads lead inland to the sights, a "Grand Canyon" the world's wettest spot (continuous rain) and the Pali coast are all within a half hour drive. As are several NASA tracking stations! We brought back about 2 hours of video including some great volcano action shots!



Henry and Sylvia enjoy Hawaiian Luau.



K2RIW Amplifier wanted

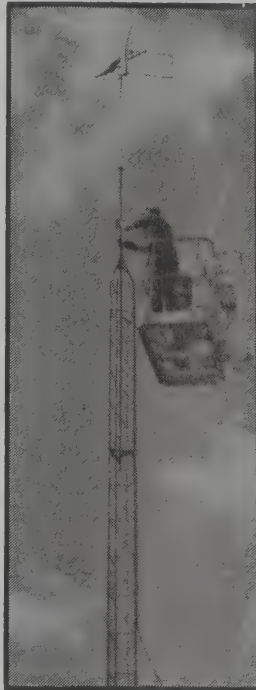
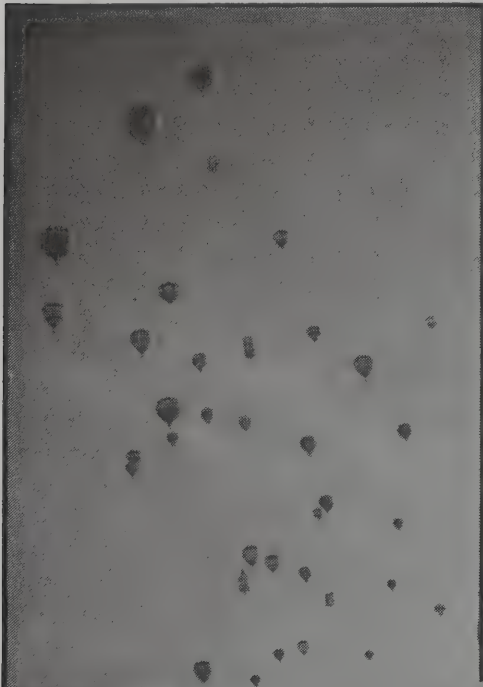
Herman McCreary KD8PE would like to locate anyone willing to part with a K2RIW amplifier for the 70cm band. He can be reached at the following address: Herman McCreary KD8PE, 3135 Wildwood Dr., McDonald OH 44437. Phone: (216) 530-6991.

ATV CLUB ASSISTS IN HOT AIR BALLOON FEST

The U.S. National Hot Air Balloon Championship was a resounding success partially due to the Baton Rouge Amateur Television Society's cooperation in allowing the sponsor of the event namely WBRZ-TV CH 2 to relay their Doppler Weather Radar through the B.R.A.T.S. ATV repeater on to the hot air balloon site 10 miles south of town.

National Championship Official Todd Fisher remarked that the B.R.A.T.S. feed of Doppler Radar was tremendously important to the fest and commended the club highly. He also stated that with the cooperation of B.R.A.T.S. supplying the feed, several serious accidents were avoided.

The B.R.A.T.S. ATV Repeater supplied this Doppler Feed daily from 4:30 a.m. to 7:30 p.m. All equipment worked well.



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N.T.S.C. ATV Repeater

ATV is alive and well in North Texas. Through the dedicated efforts of Andy Carstarphen WY5V and Ken Brooke N5EEX (and a host of others) a new ATV group was formed, the North Texas Synchronization Club, also known as N.T.S.C.. Through the efforts of this club a new ATV repeater is now active at Cedar Hill in the Dallas-Ft. Worth area.

KTVT-TV channel 11 donated space at the 1270 foot level of their Cedar Hill broadcast tower. The tower is located on high ground and covers a large portion of the Dallas-Ft. Worth metroplex. Input frequency is on 1277.25 MHz. (horizontal) with an output on 421.25 MHz. (horizontal). Excellent reception of the repeater has been regularly reported over 40 to 50 miles away. A recent mobile test received the signal out to over 100 miles to the north near Ardmore, Ok., however there was some band enhancement at the time.

The NTSC repeater is geared toward support of educational and community activities in the area and hopes to provide live video to the local storm spotter groups during severe weather conditions as well as providing support for emergency service situations.

For further information you can reach the group on their 144.34 MHz. talk frequency or contact N.T.S.C. at 1409 Wesley, Mesquite TX 75149. Telephone: (214) 289-9958 [(214) 289-WY5V]. Thanks to Andy Ross KG5VX and Andy Carstarphen WY5V for the info.



INFO NEEDED

I am looking to modify my Betamovie camera to get a real time composite signal out to feed by ATV transmitter or VCR. Can anyone provide me with the necessary info to accomplish this? As a short time reader, two issues, of ATVQ I find it above average to what is found in other Amateur magazines today. Keep up the good work. Len Bateman K9ZNE, 6116 Lane Pl., Downers Grove, IL 60516, 708 971 1660.

WEBERSAT Update

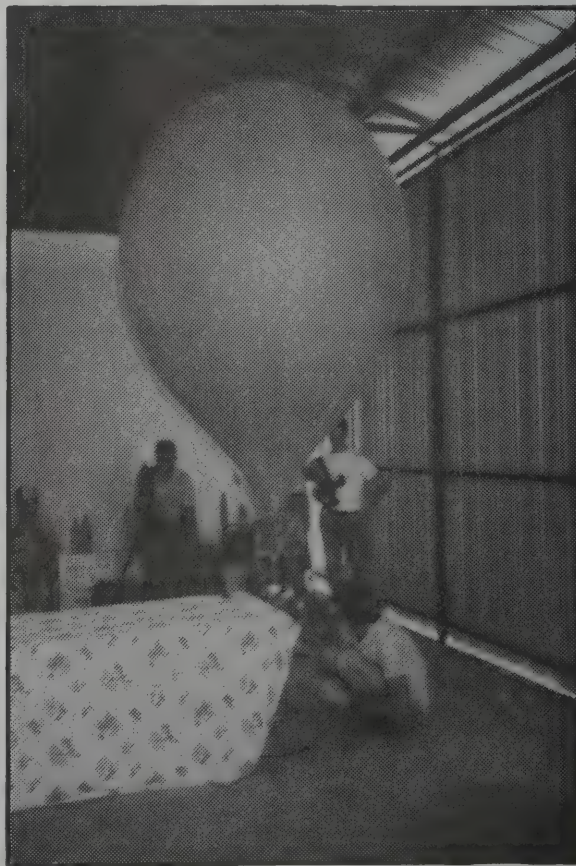
The camera tests continue with some good images of cloud patterns and shots of the sun being received by ground stations worldwide. The image shown in the photo was taken on 8/18/90 at 18:55:06 UTC while the spacecraft was somewhere over the South Pacific. This is one of the best cloud pattern images taken to date.

The ATV uplink experiment on 1265 MHz. has been attempted a few times with the Weber State College uplink site, Don KE7NR in Phoenix (35 watts into a 20 dBd array) and Bernie WD4O (70 watts into a 20 dBd system) in the Washington D.C. area. So far only weak sync bars have been detected. It appears that much more uplink power will be needed to send an image up to the satellite. Many factors such as spacecraft attitude and pointing error could be the reasons for the poor results so far. If anyone out there has a large dish or array along with some real power capabilities on 1265 MHz. ATV please contact Bill Brown WB8ELK to arrange a schedule. Telephone (603) 525-4201 x543 (daytime).

SKY BEACON 2 LAUNCHED

by

**John Bayne N4EEB
and Frank N. Haas KB4T**



SKY BEACON 2 LAUNCHED

by

**John Bayne N4EEB
and Frank N. Haas KB4T**

On Saturday morning, September 15, 1990, Stratonet Florida (a group of hams from Volusia County) launched StratoCam/Sky Beacon- 2. The 2.5 hour flight allowed hams from Key Largo to Birmingham, Alabama to North of Charlotte, NC to copy the 2 meter FM signal as well as live camera video on ATV.

Project manager/Launch Director John Bayne N4EEB of Ormond Beach, Florida described the flight as a complete success following the balloon's recovery in a wooded area about 15 miles east of the launch site. The balloon reached an altitude of 94,000 feet as it continuously transmitted telemetry on 144.34 MHz FM and a live camera view of the Earth below on 434 MHz ATV. The balloon and payload took 1 hour, 41 minutes to achieve it's highest point at which point the balloon burst allowing the package to parachute back down (the descent took 55 minutes). Total flight time was 2 hours and 36 minutes.

On board telemetry allowed mission control to monitor altitude, payload internal and external temperatures and battery voltage. The balloon rose at approximately 920 feet per minute and fell at an average rate of 1706 feet per minute. External temperatures dropped to -103 F. while the payload's internal temperature averaged 80 degrees F. during ascent. During descent, however, the package acted like a ramjet (due to a hole around the camera lens). This caused the internal temperature to drop below -40 degrees! Fortunately everything still worked even at these frigid levels.

Stratocam/Sky Beacon-2 was outfitted with a 1 watt KPA5-RC ATV transmitter (PC Electronics) and a Uniden B/W camera mounted to point down at the ground below. A overlay video ID was fashioned out of black lettering on a plastic sheet placed in front of the camera. Since the Uniden has a focus range from about 1 inch to infinity, this worked quite well particularly when the lettering was highlighted against clouds. Unfortunately during final test no one noticed that the call letters were inverted! Shades of the Hubble Telescope...If you watch a video tape of the flight just watch the TV screen through a mirror!

Excellent views of central Florida could be seen on the live video down link throughout the flight. ATV reception was reported out to over 200 miles covering most of the state of Florida. Both transmitter packages operated with 1 watt output into a specially-made helically wound dual-band vertical. The on board electronics package designed by Bill Leisner W4MPU performed flawlessly except for the extreme highest altitudes (beyond the usable range of the pressure transducer). Two hours prior to launch Frank Haas KB4T (assisted by Loretta Bayne KC4NNZ) started an HF net on 7.156 MHz. Dubbed Stratonet Control, check-ins from a good portion of

the southeastern states were logged. The net also featured live reports from the launch site via a 2 meter FM link.

Through a video link transmitted by Ernie Baldini K4RBD, live video of launch preparations was relayed to the Daytona Beach ATV repeater. Take-off occurred at 1443 Z from the Deland airport. Bill Morse WA4OBY piloted the Chase 2 aircraft which followed the balloon up to 14,000 feet. His altitude and position reports allowed the ground crew to compare his reports against the down linked altitude data. Chase plane 1 piloted by Bill Leisner W4MPU and accompanied by Bruce Kalashian KB4GW tracked the package as it fell to earth and aided in pinpointing the final landing site.

A balsa weather vane arrangement worked well and helped stabilize the package. However, after balloon burst the package started spinning at a very rapid rate (92 rpm). Fortunately Vic Leisner W3LGV was able to capture still frames with his SSTV converter. With this arrangement he received a good picture of the landing site just before impact. Using a road map, he was able to direct the chase crew into the general landing area. Apparently the payload had actually travelled out over the ocean for awhile but an on shore wind brought it back to solid ground during the final few thousand feet of descent. The chase team closed in on their quarry and started to receive an excellent picture from the ATV transmitter. They were surprised to see the smiling mustached face of Larry Webster N4URS peering up into the camera lens! Larry found the payload hanging 15 feet up in a tree about 13 miles east of the launch site near the town of Samsoula, just 7 miles from the ocean. The payload was dragged down out of the tree about 2 hours after landing with plenty of battery life still left (another few hours). More flights are planned. It looks things are looking up for ATV in central Florida!

The launch support team:

Chuck Barley K4EVA - use of CAP hangar at Deland airport; Nat'l WX Service - Ruskin, Florida; Paul Miller N4WKQ - Balloon preparation; Tawney Miller N4WKR - Launch site support; Clay Langston WB8ZMV - Launch site support and video taping; Bill Leisner W4MPU - Payload electronics design and construction; Vic Leisner W3LGV Video repeater service; Ken Vanslette WB4FKL - Computer landing prediction; Ernie Baldini K4RBD Launch site video relay to Daytona Beach Repeater; Bill Beyer WD4GDZ - Launch site support; James Crabtree N4VZL - Launch support and recovery; Norm Stimpson - Launch site support.

LETTERS, WE GET LETTERS

DE WA4MTG-TV, John E. McLemore, Montgomery, Prattville, Wetumpka.

Wow, put a fast scan RPT on and every body (living or dead) wants on...Ha Ha. Well, I will have a cross-band RPT on (as soon as it cools off some) 910.25 in 426.25 out, lots of eavesdroppers say they will get on if they get excited. I plan an airplane ride as soon as I get the RPT on and somebody to pass video back to me. One way video ant' much fun, what a change? Mobile and Huntsville ala on with their own fastscan RPTS, will wonders N E V E R cease?

P.C. Electronics say they are very busy.. that is GGGGOOOOOOODDD NEWS !!! If we in the Southeast don't get on, the freq may vaporize!!! Just like 220!!! Finally got my VDG-1 video ID from Elktronic. Boy is he slow!!! TTTTOOOOOOOOOO-many irons in fire!! The board works really well. I hope to get a feed off the WX radar for use during bad WX.

**DE: K6YDW John Neeley
Tahoe City, CA 95730**

Really enjoyed the last issue of ATVQ, not just because my article on the Backpack portable was in it, (huh, I forgot I even sent it in!), but sure nice to see the larger issue and more articles being submitted to the magazine. Enjoy Lyn Cyr (W1NRE) articles on the using of the C/64 computer for ATV repeater control. I wrote an article in the July 1990 issue of 73 dealing with the conversion of the C/64 and 1541 Disk Drives to 12 volts, which might be of some interest to others that don't have Auto-boot capabilities.

Also, got a big kick out of the picture on page 61, showing Tony P43T sitting at his shack in a Trench-coat! Geez, I thought it was warm down there in Aruba?

I am wondering if anyone has come up with a reliable circuit for Auto Recording on VCR when not at home? I sorta have an idea on how to do it, but not really sure it will work yet, until I build up the circuit and try it out. Was going to use a Horizontal Sync detector circuit (LM 567) which then would output to a pair of NE 555's. One NE 555 would give a short pulse to turn on the Record button on the VCR, when a signal was present, then the other would give another short pulse to the Stop button, to shut it off. Wonder if you know of any such circuit around that others have used? Guess maybe I should gather up some parts and work it out and if so, submit it to you.

Still haven't found anyone on ATV around this remote area of California. Being up here in the boonies, where very few hams live, and those that do are mostly second home people, activity is sparse, except for me playing around here in the shack, looking at myself. I am sure there are a few guys

in the Reno/Sparks (Nev) area, but Haven't been able to contact anyone down that way. Tom, W6ORG sent me a list of fellows who have contacted him, but I have called them on different 2 mtr. repeaters, with no luck as of yet. Course, it would take a repeater for me to work into that area, as got a tall ridge of mountains between us. I have gotten the Placer County Sheriff's Search and Rescue Unit interested in ATV, which I am a member, and in fact, we are having a mock SAR event on Sept. 23rd, and will be taking the ATV gear to it, and hopefully show its capabilities. In fact, in their new Comm-Van, they are planning on installing ATV receive capabilities, which will be interesting.

About it from this neck of the woods, so keep up the good work Henry. Also, at this time, I am planning on attending the '91 Dayton Hamfest, and sure hope I can make it.

Harry WB7PVO, TootleVision Broadcasting

We have interfaced our station(s) with the Tulsa Amateur Radio Club (TARC) and the Tulsa Repeater Organization (TRO), here locally, and in cooperation with Mike Zilliac, KB6MT, we have been broadcasting Novice, Technician, and General class theory on Sunday Nights! In addition, the TRC has been simulcasting the televised training programs on the 146.88 repeater (WB5LQZ). The response in Tulsa has been TREMENDOUS! We anticipate to have our WEFAX and 1270 ATV repeater systems on line (on TV33's tower); by January!....

Also we have been airing several ARRL promo tapes, as well as the WB5JLZ/ATV (Baton Rouge, LA) Demo tape that I believe you and Bill Brown made possible for us to receive. Thank You...

If you, or any of your readers have any other "Ham" video suitable for broadcasting, I would be happy to provide the air time, for you...

**Central Gulf Coast ATV
Warren Locklin**

As we approach the second anniversary of the second generation of ATV in Mobile, it seemed appropriate to summarize what has transpired during that period, both in Mobile and with the other groups that participated in the first meeting that took place in Biloxi, December 9, 1989, and covered in the January 5, 1990, ATVQ on page 30.

Another activity that prompts this is the explosive appearance and success of the Huntsville TVATV special interest group of the Huntsville Amateur Radio Club. Preparation of this article was aided greatly by a conference held September 12, 1990. Participants included Steve Gomez, KE50 of Beaumont, Texas, Kenn Guillot, WB5JLZ of Baton Rouge, Louisiana, Bob Spahn, WD5BJW of New Orleans, Louisiana, Ernie Blair, WA4BPS, Leon Bell, WB4LTT and Gene Marcus, W3PM, all three of

Huntsville and yours truly. Thanks fellows.

During the timeframe covered by this article, the Pensacola group has Elmer'd Mobile and even committed financing for a joint repeater effort. They have been on the air for over twelve years and have seen ATV efforts come and go. The Mobile group at that time also individually committed to specific financing and potential sites were reviewed.

The first ATV pictures this second time around originated December 27, 1988, as covered in the July, 1989, ATVQ on page 27. Unfortunately at a meeting covered in that same ATVQ, on page 9, two members of the original Mobile group opted for a social ATV club with a repeater as the second priority. This effectively nullified the financial commitment made previously. This handicap has been overcome and work started on an in-band repeater (with all its inherent problems) in February. Perhaps by the time you read this, the repeater will be operational. Input will be 439.25 with output on 426.25. All this without help from the current and previous RACES officers, even though the emergency management group did permit some of the recommendations made to enhance C.A.P. capability to be implemented. However, the weekend sundown flights to Dauphin Island ended with the Labor Day weekend so with only five complete ATV stations and only one really active, the repeater becomes doubly important if activity is to continue through the winter. We'll see.

Notwithstanding the lack of coordination for the scheduled March meeting in Biloxi as covered on page 30 of the January, 1990, ATVQ, ATV activity in other areas has boomed on the Gulf Coast. The process of linking towns is much further along with either a Baton Rouge to New Orleans link or Beaumont to Baton Rouge link being a toss up as to who will be first. Kenny, WB5JLZ and Bob WD5BJW have been planning on a link to make New Orleans and Baton Rouge ATV more consistent. Since before our December ATV meeting, the hope to acquire a microwave link from New Orleans East that was to be abandoned when replaced by fiber optics fell through. In the meantime, Kenny is upgrading and adding features and flexibility to the Baton Rouge repeater so a link may become a luxury if New Orleans can upgrade or modify their repeater.

Steve Gomez, KE50 in Beaumont, has requested two channels of his company's new T-1 digital carrier system, from Beaumont to Baton Rouge, when it becomes operational. Looks good! As Steve puts it, they haven't said no. Here's hoping.

The New Kids on the Block? Well, when I first talked with Dick Christianson, KK4HF in March, he expressed interests in linking up with the Coast. Choice sites would be Pensacola, Pascagoula, Biloxi or possibly Mobile. Since then this fast growing special interest group (S.I.G.) have realigned their priorities. Civic endeavors on a local basis must come first if ATV is to contribute. For instance, the ATV activity Memorial Day when the Huntsville group provided coverage for the track club's 10K run. Huntsville is unique in that they are located almost at the Eastern terminus of what is known

as tornado alley that stretches west southwest to northeast across middle and north Alabama. Kenny in Baton Rouge is already providing an invaluable service with his weather camera at the top of the capitol building. Anyway, in our conference, September 12th, Ernie informed us that linkage west to east should be their first priority and everyone seems to agree. The north-south link is still planned but as with all of these options will be just a little further down the road. Ernie did however suggest we start the ATV voice net up again. All agreed so September 18th at 7:30 CSDT, look for us on 3.878.

With all the preceding, Pensacola continues to be the sleeper. They keep moving along, taking advantage of technological improvements, and quietly holding their regular P-5 schedules.

That's it for now. On our next anniversary perhaps we'll be on fiber optics with channel master amplifiers, etc. Till then 73, N4RUC.

ATN (So. California)

The Santiago Peak ATV repeater recently got an 80 watt amplifier for it's 1253.25 MHz. output. Receiving stations indicate a P-unit improvement over most of the coverage area. The inland Empire receives P5 quality pictures and many areas of the San Fernando Valley and San Diego county can see the repeater P4 while mobile. Both the Crestline and Oat Mountain 900 MHz. ATV repeaters have moved frequency to 919.25 MHz. output due to a new bandplan in southern California. The simplex/repeater input frequency has been changed from 910.25 MHz. to 913.25 MHz. From the ATN newsletter (Sept. 90).

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FROM THE QUAD CITIES ATV CLUB DEVENPORT, IA

An article appeared on the Quad City times under letters to the editor on August 23rd, authored by KOAAG. BIX 7 RACE TAUGHT AMATEURS MUCH ABOUT LIVE COVERAGE was the heading.

An August 12th letter to the editor from Gene Kimble complaining about the live coverage of the Quad-City times BIX 7 was directed at KWQC-TV. One of the best kept secrets is that the live coverage of the race, which was seen only at the V.I.P. viewing sites, was provided by the Quad City Amateur Television Club. This was our first attempt to provide this type of service and we learned a great deal from the exercise--like how hard it is to do.

Low power TV signals were broadcast from seven locations along the route, and four special V.I.P. viewing sites were set up to receive the amateur TV repeater station located at the KWQC-TV studios on Brady Street. KWQC-TV cooperated by furnishing camera (Video) input at some locations, and by feeding the amateurs some live video from their studios, but the "production" was entirely done by Hams.

Even the camera in the lead vehicle was operated by a Ham, WBOBIZ, and one of the signals back from the car to the studio was a Ham signal. (Where duplication existed, the Ham radio signals compared favorably with those returned by commercial equipment.)

The whole operation was planned by Dave Johnnsen, WBOFBP. The Quad City Amateur Television Club wishes to thank KWQC-TV for its cooperation. We very much enjoyed doing the BIX 7 live. Perhaps we will do a better job next time, but the experience taught us just how hard it is, even for a commercial station, to televise such an event. This article passed on to us by WBOBIZ-Thanks John!! - - - - -

Jim-Koaag, sent us his version of the BIX 7 run as he saw it from his assigned position, site #2 atop the Brenton bank.

I had planned to be completely set up by 7 o'clock and then grab some breakfast at the Village Inn restaurant--perhaps pancakes, juice, and coffee. Earlier on Friday, WBOFBP, WAQOE, KA9RQC, and myself (KOAAG) had planned it all out and completed a trial setup of the transmitting site successfully. We were using a TX70-1 transmitter and a five element yagi on a ten foot mast to transmit pictures provided by a KWQC camera crew back to the Quad City Amateur Television Club's repeater at the KWQC studios. So all that was left to do was to reassemble it and set up a receiver, and that was straight forward--I thought.

I arrived at the site, the Brenton bank at Kirkwood and Brady, at 6 a.m. as planned. I was early as the TV crew from Channel 6 had not yet arrived with the camera they were going to use for their

taping. So I went around to the other end of the building where the receiver was to be located. Nothing was ready to be hooked up there either, but the tripod, mast, and coax were there as promised and it looked like a five-minute job. I left a PC electronics down-converter and a radio shack UHF antenna modified for a PL-259 coax connector, and returned to the west end of the bank where the TV crew was, having now arrived. We carried the equipment to the roof and began setting up. We were slightly inconvenienced when we found only one electrical outlet for two pieces of gear. But the bank furnished a multiple outlet strip and we completed our set-up without a hitch. As soon as the camera was turned on, we checked with Don Schneider, WDOAMA, who was at the TV repeater site to switch from one camera site to another. He reported P5 (Excellent) pictures from my location so I proceeded back to the receiver site. By now, we had a TV set and power for the set, but it too, was a single outlet and we needed two, one for the TV set and one for the downconverter. I let someone else find a multiple outlet while I proceeded to hook up the downconverter and antenna.

Right away I discovered there was a problem, two problems to be exact. The mast for the antenna was too big in diameter, and the U-bolt for the antenna would not fit over it. By that time, Bob Schneider, a harmonic of WDODUK, had arrived and we looked around for a substitute mast. He found an unused steel fence post, and we appropriated it as a mast. The U bolt fit around it just fine, and so we got the antenna up. But when I went to connect the antenna to the down converter, another serious problem became apparent. The length of coax that had been furnished to me had N-type connectors on both ends, and my downconverter and antenna both had PL-259 connectors. This appeared to be an insurmountable problem and a frantic call for help was made, but everyone else had their own problems. Then I realized that the coax was actually two pieces with PL-259 connectors and a barrel connector in the middle to connect them together.

The best solution appeared to be to connect the two N-type connectors together with an N-type barrel connector and that would free up the two PL-259 connectors for the downconverter and the antenna. WA0OE and KA9RQC, the fellows at the next site down Kirkwood Blvd. at the Presbyterian church about two blocks away, had an N-type barrel connector, and Bob went down to get it. When he returned, we got it all together, and Viola--Great pictures from the repeater.

But it was now 7:30 and too late for those pancakes. I returned to the roof of the bank and everything went off without a hitch. We transmitted intermittently until about 9 a.m., when it started raining slightly and the TV camera crew wanted to close down. So we tore down, finishing by 9:30. I then went home and had breakfast. Thanks to Jim-KOAAG for supplying this article.

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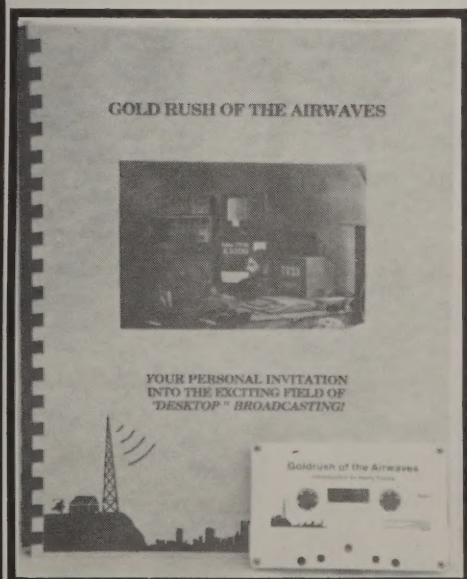
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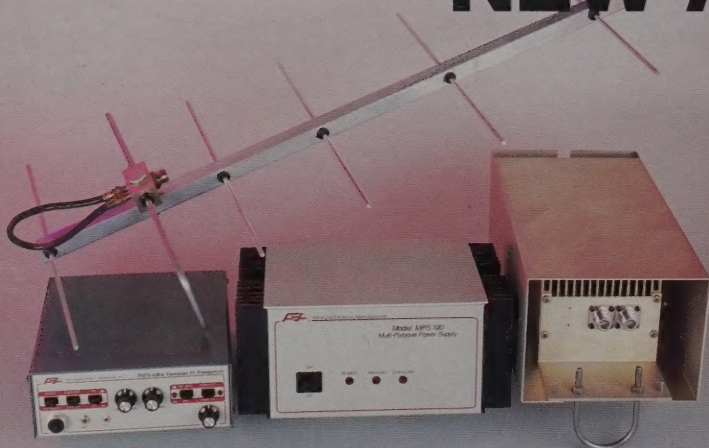
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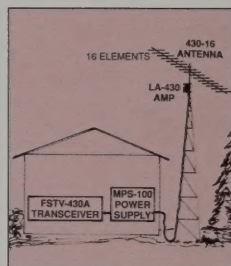
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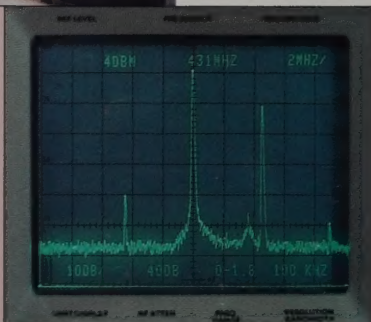
monitor your transmitted and received pictures. If you want to broadcast with more power, AEA also offers a 50 watt mast-mounted linear amplifier with power supply.

The FSTV-430A Transceiver features a low-noise UHF GaAsFET preamp with a typical noise figure of less than 1.5dB and a crystal-controlled or variable tuning down converter. Output is available on channel 3 or 4 for signal reception AND monitoring transmissions. Two frequencies can be selected from the front panel for transmission (one crystal is included). The AEA design is also optimized for superior video and audio quality without sync buzz even with weak signals. The FSTV-430A is the only transceiver you need to work ATV and it also allows you to use the same TV set to monitor your transmitted and received pictures.

The LA-430/50 Amplifier with Power Supply gives a boost to your ATV signal. It includes a 50W P.E.P. mast-mounted Linear Amplifier (**patent pending**) covering 420 to 450 MHz and a GaAsFET preamp which utilize the antenna feedline for DC power. The mast-mount eliminates the line loss between the amplifier/preamplifier and the antenna to improve both transmission and reception, and is the equivalent of a 100W amplifier in the shack with a 3dB line loss. The amplifier is housed in a weather-resistant anodized aluminum case. The MPS-100 power supply also provides a 13.6 volt output for the FSTV-430A.

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